THE UNIVERSITY OF ALBERTA

REGIONAL CONSIDERATIONS IN PULP: THE COMPETITIVE POSITION OF THE PULP INDUSTRY IN ALBERTA

by

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The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies for acceptance, a thesis entitled 'Regional Considerations in Pulp", submitted by Denis Anthony O'Malley in partial fulfilment of the requirements for the degree of Master of Business Administration.

ABSTRACT

This study attempts to discover, from a theoretical standpoint, factors which affect the regional development of the pulp industry. The discussion is concerned primarily with the pulp industry in Alberta.

A general review of pulp markets shows that, although they are buoyant, considerable difficulties face the Alberta producer attempting to penetrate them. These difficulties are primarily due to well established producers existing in closer proximity to these markets. This points to the necessity for careful product differentiation based on actual advantages of raw material available in Alberta.

The treatment of costs in the pulp industry points to the importance of wood costs and distribution costs. Stumpage costs are treated in some detail so as to point out the possible disadvantageous effects of methods of stumpage appraisal on costs of wood in different regions. Logging costs and inwards transportation costs are shown to have prospects of reduction in future, but the presence of regional differences in these costs is not shown. Manufacturing costs are not considered. Distribution costs are shown to have smaller regional differences than might at first be expected, and the possibility of future advances in transportation technology reducing these costs is appraised.

Management methods imposed by forest owners are shown to have considerable regional effects and the concept of sustained yield is examined and criticized. Evidence brought forward

would indicate that Alberta's forest resources are not being utilized for their highest value, resulting in poor returns to the Province and the industry.

The study points out that theoretical problems exist in appraising regional differences in the pulp industry's development. Although the effects of these problems are essentially of a short run nature, the short run in this case could be of the order of 70 years due to the very long cycle of the forest products industry.

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It is impossible to thank all those who have helped, through their time and interest, in the production of this thesis. I would like to mention them all here.

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ABBREVIATIONS

The following abbreviations are used in this thesis:

U.S.	United States of America
U.S.S.R.	Union of Soviet Socialist Republics
F.A.O.	Food and Agriculture Organization of the United Nations
cu.m.	cubic metres
m.t.	metric tons
kg.	kilogramme

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CHAPTER I

INTRODUCTION

Alberta and the prairie provinces, have long been accepted as agricultural production economies and pessimistic views as to their possible development industrially are common. This view is opposed by those who, observing the large capital investment in extractive industries which has occurred in Alberta since 1941, consider that the presence of such large quantities of capital makes industrial development in Alberta likely. However, Caves and Holton[1] conclude that despite new mineral discoveries, the lack of major markets is likely to cause final processing of products to occur elsewhere and -- "the prairies seem destined to remain essentially agricultural".

On the other hand the Royal Commission on Canada's Economic Prospects predicted for the Prairie Region, the Yukon and Northwest Territories, a doubling of timber output by 1980, and a six or seven fold increase in pulp and paper production. "The forest resources of the Prairie Provinces themselves warrant the belief that the forest products industry will prove a progressively important dynamic of the Prairie Region.[2]"

Ten years have now elapsed since that study was made and although the quality resources and market expansion foreseen by the Royal Commission have remained available, large scale development of Prairie pulp and paper industry remains largely a long history of delayed plans or no plans at all. To be sure Manitoba has taken advantage of its direct transportation links and proximity to large markets to develop its

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pulp and paper industry. Saskatchewan is building a pulp mill and Alberta hears plans for its second, but where is the three or four fold increase in production to be expected from the deliberations of the Royal Commission? In the special case of Alberta, it is to determine the possible reasons for the limited development of the pulp and paper industry that is the task of this thesis.

For several years three areas of Alberta, suited by their resources and topography to pulp production, have been made available for development. Only one has attracted serious and continuing interest. Those attracted to the development of the others have turned away.

It seems apparent then that adequate supplies of raw material are not sufficient to attract the pulp industry to Alberta, and that there is a need to examine the industry in order to ascertain what other reasons there are for the slow development of the pulp industry in Alberta.

This thesis therefore attempts to examine the pulp and paper industry and all factors pertinent to its development elsewhere as well as in Alberta to discover if any section of the industry is better suited to Alberta conditions than others and furthermore to attempt to isolate factors which might prevail against such development.

One of the most recent and far reaching examinations of conditions on the prairies for economic development is that performed by the Committee on Manitoba's Economic Future.[3] Taking the position that in the early 1960's Manitoba's economy was in the process of making a faltering change from an

extractive and service economy to "an industrial economy based on manufacturing and processing of raw materials for sale in a widening range of export markets" .. the authors take the position that the need for a clear sense of direction arising out of changing institutions, attitudes, skills and services over-rides all others as a requirement for economic advancement.[4]

In the case of forest industries the study advocates a governmental position short of direct subsidization of private enterprise, but directed at making Manitoba's forest resources available under terms competitive with other sources of pulpwood and sawlogs. However, the whole responsibility for development is not placed on government. The post-World War II development of prairie markets by outside manufacturers has filled what was an apparently closed market in spite of high transportation costs. The local producers have suddenly been faced with strong, efficient competition and have been forced and are being forced to realize that they must become more efficient if they are to survive or progress.

The Committee's study advances three arguments pertinent to the development of the pulp and paper industry. First: for the development of the industry such factors as low wood costs, guaranteed wood supply, and location proximate to the expanding U.S. market were seen as only short run factors, to be taken advantage of by attracting industry into the area. A survey by the Committee showed wood costs to account for 50 to 75 percent of total costs of manufacturing pulp. However, the study did not specify the definition used to measure wood costs.

The Committee attached considerable importance to the

changing forces in the industry and their effect on present advantages possessed by the province. "Changing world market conditions, changing technology, and the use of new raw materials not now considered economic could destroy some of these advantages." It concluded that present advantages could be nullified within a period of a decade.[5]

Second: The committee observed a strong trend to locate small paper mills near the markets but drawing their supply from larger pulp mills located near the raw material.[6] This trend could be favourable for Alberta and its presence can be borne out by the existence of the present pulp mill in Alberta, which produces pulp sold to paper producers in the U.S. Midwest and Atlantic sea-board markets.

Third: The Committee saw the initial need for pulp and paper industry development as a means to advance the manufacture of highgrade lumber and plywood. Considering the mixed tree sizes in Manitoba's forests, the Committee considered that integrated utilization of logs was necessary in order to avoid waste. This point will be amplified later in this thesis.

The Committee on Manitoba's Economic Future felt that there were no major factors preventing the development of the pulp and paper industry on the prairies. It must be pointed out, however, that Manitoba is not in an identical position to Alberta in this regard and this fact will be examined later in the thesis.

The adequacy of Canada's forest resources are not seriously doubted here. The total drain on these resources in 1954 has been estimated to be two thirds of the possible cut or gross

annual growth, when losses from fire, insect and disease as well as cutting are included.[7] What is relevant, however is whether these resources are economically available for exploitation. In an explanatory note the Royal Commission stated:

> "As our country grows and the demands on its forests increase, the problems of economic inaccessibility of remote stands will lessen. To go to the Peace River District for pulpwood is as yet uneconomic; to go there also for minerals and power may transform the prospects."[8]

Under the terms of this thesis this appears to be a rather bald statement. The reasons, if any, which make development of the Peace River District, or any other region of Alberta uneconomic for the extraction of pulpwood are the objects of the study.

As if mindful of the excessive optimism of its earlier pronouncements, the Royal Commission on Canada's Economic Prospects, in its Final Report, warns that "the performance of the forest industries ... will be largely determined by their competitive efficiency."[9]

Historical Trends

Turning to the historical development of the industry, the study by J.A. Guthrie and G.R. Armstrong discusses this in a most concise and thorough way.[10] They point out that historically the North American pulp and paper industry has developed where a lumber industry was already well established. This development is explained by the growing demands for soluble and sulphite pulps from paper and rayon manufacturers. These pulps are produced especially well from western spruce and hemlock, species not especially valuable as lumber. Hence the

established lumber mills have not only mill residue and small logs to dispose of, but also species in sawlog sizes not especially valuable as lumber. This gives the pulp mills an advantage in locating near large lumber mills, with the important proviso that the woodlands contain a mixture of both ages and species.

This point seems important to Alberta, considering the health of the lumber industry in this province. Relative to British Columbia the Alberta lumber industry is not strong. However, it competes efficiently with other prairie producers for United States markets. Taking the general view, the Alberta lumber industry cannot be said to be well established, consisting as it does of many medium sized and small mills. However, this is because the province does not contain the large old growth quality stands of sawtimber possessed by British Columbia. On the other hand, there are many large stands of species suitable for pulpwood which are available for exploitation. As a point of conjecture, it would appear that the historical pattern for the pulp industry would not be followed in the case of Alberta.

A more recent trend developing in the pulp industry is the use of mill residue.[11] In the decade of the 1950's the use of mill residues expanded until it reached almost two-fifths of the total raw material used for pulp production. The limitation on the growth of this innovation has been the absence of a suitable low cost portable barker; a situation which has prompted some pulp mills to finance barkers and chippers for sawmill operators in return for their product and has also resulted in the appearance of the custom chipper who barks and chips small logs, slabs and waste obtained from sawmills. The pattern of

growth has been for pulp mills to buy from surrounding sawmills the available mill residue; but occasionally large sawmill operators with sufficient capital have installed their own pulp manufacturing facilities.

These two trends have prompted a third which is treated in more detail in the text. There has been a movement in recent years, prompted by rising wood costs and a desire to obtain more utilization of logged timber, for woodlands operations to become integrated between pulp mills and sawmills. Operating in a loose confederation, the two industries have been able to obtain the economies available from clear logging by disposing of products to their best uses and avoiding the use of high value sawlogs for pulp and vice versa.

Costs, especially wood costs, vary from region to region in the pulp industry. Also they are very difficult to obtain for comparison. Guthrie and Armstrong[12] present cost data for the years 1935 and 1945 which show advantages in wood costs for pulp manufacturers located in the South and the Pacific Northwest of the United States. Subsequent data produced for pulpwood costs show the same areas having considerable advantages with the specific inclusion of British Columbia.

In discussing the position of Alaska, Guthrie[13] and Armstrong point out, among other difficulties, the remoteness of the state from consuming areas and the consequent high transportation costs. This is a problem faced also by Alberta producers who, while considerably closer to consuming areas, are compelled to use land transportation to ship their product. Alberta producers also suffer higher inward transportation

costs on pulpwood where river systems do not allow timber driving to the mill. Considering the interior of Alaska, Guthrie and Armstrong consider the development of its extensive timber resources to be far in the future and the coastal resources to be "one of the peripheral areas of pulp and paper expansion".[14] Many of the same problems on the supply side face the Alberta area.

Referring back to the Final Report of the Royal Commission on Canada's Economic Prospects[15] brings up another facet of the development of the pulp and paper industry in Canada. The elimination of tariffs on the entry of Canadian newsprint and pulpwood into the United States prompted the great subsequent growth of newsprint manufacture in Canada. Foreign tariffs are seen as barriers to an equal degree of specialization by Canadian producers of other pulp and paper products.

These tariffs have restricted Canadian producers to the small but growing Canadian market for these products and have thus prevented any degree of product specialization such as is evident for newsprint manufacture.

Tariffs have a large effect on the local performance of the industry. Indeed tariffs erected by Canada against foreign products indirectly affect the local pulp and paper industry by raising the prices it must pay for products it would otherwise import, such as paper making machinery and logging equipment. Hence the future behaviour of tariffs has an important impact upon the prospects of the industry as a whole, while having little impact on the relative advantages of regions within Canada.

Many other factors exist and affect the industry's development to a greater or smaller extent. Some, like the quality of local entrepreneurship, are out of the scope of this study, while others, such as the extent of inducements offered by regional governments, are irrelevant to the problem at hand.

It might be argued that inducements offered by other areas such as Manitoba, Saskatchewan and Ontario have considerable bearing on the location of the industry. This has not been accepted for this study because of a desire to discover the factors arising from administration of the resource and other non-artificial conditions which affect the industry's location. Hence, the fact that the Saskatchewan government will guarantee loans for the purposes of establishing pulp operations in that province is not considered here. The policy of the government of Alberta has been to avoid having industries establish in the province under protection of artificial conditions created by government. Presumably one of the reasons for this has been a desire not to be committed to a continuation of effective subsidization in order to support an industry which is not capable of surviving after initial inducements have been withdrawn.

The problem, stated again, is then to discover what factors exist which may prevent location of pulp and paper operators in Alberta, bearing in mind the market opportunities of the industry as a whole and the timber resources available in the province.

The method of attack is from a theoretical standpoint. This method has been chosen due to the reticence of the industry about its actual costs, especially when such data would be used

for regional comparison. The approach has therefore been theoretical, attempting to develop a model of cost behaviour from the underlying constraints and comparing this with available market and cost data.

This study considers markets, costs, and forest management in that order. Studying markets points out one of the major disadvantages to Alberta producers. That is large transportation costs occur because of long distances to major markets. Wood costs appear to be most important to Alberta producers due to the methods of stumpage appraisal in use and also the costs of inward transportation of logs to the mill. Fabrication costs are not considered to have major regional differences since the technology of pulp production is well known. What differences do arise here are primarily due to differences in labor costs and availability. Forest management affects the quality of the resource and hence wood costs.

REFERENCES

1. Caves, Richard E. and Richard H. Holton, The Canadian Economy: Prospect and Retrospect, Cambridge Mass., Harvard University Press, 1959, pp. 206-215. Original not seen, available in Watkins M.H. and D.F. Forster, Economics: Canada, Toronto, McGraw-Hill, 1963.

2. Canada, Royal Commission on Canada's Economic Prospects, Study by R.D. Howland, Some Regional Aspects of Canada's Economic Development, Ottawa, 1957, p. 130.

3. Manitoba, Manitoba 1962-1975, Report of the Committee on Manitoba's Economic Future to the government of Manitoba, Winnipeg, 1963.

4. Ibid., p. 11-1-1.

5. Ibid., p. V-3-11.

6. Ibid., p. V-3-11.

7. Canada, Royal Commission on Canada's Economic Prospects, Final Report, November, 1957, Queen's Printer and Controller of Stationary, Ottawa, 1958, p. 204.

8. Ibid., p. 208.

9. Ibid., p. 210.

10. Guthrie, John A. and G.R. Armstrong, Western Forest Industry, Published for Resources for the Future, Inc. by the John Hopkins Press: Baltimore, 1961.

11. Ibid., p. 121.

12. Ibid., p. 114.

13. Ibid., p. 212.

14. Ibid., p. 213.

15. Op. cit., p. 198.

CHAPTER II

PULP & PAPER MARKETS & THEIR CONDITION

Canada's Export Markets

Pulpwood.[1]

Canada exports pulpwood primarily to the U.S., however more than one third of Canadian pulpwood exports go to Europe. World pulpwood exports have shown a slight rising tendency from 10,628,000 cu.m. in 1956 to 13,778,000 cu.m. in 1965. This reflects increasing imports by Europe where little virgin forest remains and timber production is almost entirely from sustained yield harvesting and small, but growing, imports from Asia.

The markets in the United States can be expected to continue strong for Canadian pulpwood due to the proximity of the market and the prevalence of international operating companies in the pulp and paper industry. However, the European market for pulpwood is not so easily assessed. Although Europe's timber resources are almost entirely operated on a sustained yield basis, enlarged capacity is not only possible but is being obtained. Through use of intensive forest management techniques and advances in reduction of waste, European pulp manufacturers can be expected to hold their imports of pulpwood down. Much of this increase in pulp production has come from diversion of fuelwood to pulp. The Asian market may well vanish with the development of technology capable of producing pulp from tropical hardwoods. At present temperate hardwoods are

being used in pulp and paper operations and the drive towards home manufacture brought on by the difficult balance of payments situation of under-developed countries should cause Asian producers of pulp and paper to arise as soon as this is technologically feasible.

Furthermore the low value added in cutting pulpwood makes pulpwood export a poor contributor to the exporting economy and a poor use of resources capable of producing a high value product.

In discussing imports of pulpwood from the U.S.S.R. to western Europe, the F.A.O., in <u>Timber Trends and Prospects, a new appraisal, 1950-1975,</u> makes the following comment.

> "It is considered unlikely that there will be any marked increase in imports of pulpwood, for it is an expensive commodity to transport over long distances, and the major supplier, the U.S.S.R., is rapidly expanding its pulping capacity. In the future, it must be reckoned that more and more of the pulpwood that is now exported as such will be converted in the country of origin to wood pulp" [2]

This same factor mitigates against domestic transport of pulpwood over long distances in Canada, unless waterways can be used.

The F.A.O. also points out that within Europe, much of the requirements for pulpwood and wood fibre is drawn from the northern European countries, which have a surplus of timber, especially Finland, Sweden and Norway.

Wood Pulp.[3]

Canada and Sweden are the largest exporters of wood pulp in the world followed by Finland and the United States. The largest importing country in the world is the United Kingdom

while Europe dominates the world for total imports of pulp. European countries exported in 1965 approximately 7,034,000 metric tons air dry weight both to other European countries and to other parts of the world, while imports totalled 7,663,000 metric tons air dry weight.

Canada's dominating position in world exports of wood pulp is almost entirely explained by the magnitude of her exports of wood pulp to the United States. So large is the quantity which Canada exports to the United States (2,555,000 m.t. in 1965) that it results in the United States exporting more wood pulp out of the North American continent (1,203,000 m.t. in 1965) than does Canada (904,000 m.t. in 1965), while Canada's total exports of wood pulp (3,495,000 m.t. in 1965) exceed those of the United States (1,273,000 m.t. in 1965) by 2,000,000 metric tons.[3] This results in both Canada and the U.S. exporting approximately 600,000 metric tons (air dry weight) to Europe while the U.S. exports more than Canada to every other area of the world except the Pacific.

The Asian, African, South and Central American markets are probably dependent upon the development of technology with which those countries can develop their own wood pulp facilities and hence are unstable long run markets. Rapidly increasing internal demand for wood pulp may prevent the U.S.S.R. from exporting significant quantities of wood pulp for some time. However when the U.S.S.R. does begin exporting wood pulp, her logical market would be Europe and the ability of Canada and the United States to compete with the U.S.S.R. for that market would then be much reduced. The U.S. market seems likely to

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be stable in the long run. Hence Canada's position of dependence upon the U.S. market, is dictated by prevailing market conditions.

Expansion in Canada's market for wood pulp will depend upon the extent to which Canada can compete for European markets and Japanese markets and the extent to which consumption of wood pulp in these markets grows.

Wood pulp, while having a higher value added than pulpwood, cannot generate as much income for the producing economy as further processing will yield. To refuse to supply wood pulp to foreign producers of pulp products denies a market to Canada, but export of final products at prices competitive with those produced from imported pulp produces more income per unit of export for the exporting economy. This holds true in any case, even though markets may not be available in Europe for exports of pulp from Canada.

The following statement of F.A.O. is significant here however, when considering the European market.

> "In the British Isles and the European Economic Community (by far the most important consumers of paper in Europe) raw materials such as waste paper, broadleaved wood, rags, straw and grass are available in quantity, but the raw material for long-fibre pulp is scarcer. There will therefore be a heavy and growing demand for long-fibre pulp to supplement local production and to give the domestic paper industry the mixture of fibre it requires. Europe's pulp imports from overseas in 1960 were in fact almost entirely of long-fibre chemical pulp -- 73% from North America, 19% from U.S.S.R., and the balance from South Africa and New Zealand."[4]

In spite of this, F.A.O. considers that European demand will eventually outstrip the capacity of European mills to produce paper, thus eventually requiring imports of final products to meet demand.[5]

This conclusion is borne out by reference to Table 2-1, the tabulation of production and apparent consumption of wood pulp in Europe and the United States. This tabulation has been derived from data contained in Appendix A of this thesis. Note that while the increase in apparent consumption in Europe (72 percent) between 1956 and 1965, was larger than the increase in North America (40 percent), it was not covered by an equivalent increase in production in Europe (65 percent). Also note that for Europe, for all but 2 of the 10 years covered, apparent consumption was larger than production in absolute terms.

Newsprint.[6]

Canada is the largest exporter of newsprint in the world. Her largest market is the U.S. which in 1965 took 5,545,000 metric tons of Canada's total export of 6,523,000 metric tons of newsprint. The next largest market for Canadian newsprint is the United Kingdom which in 1965 took 336,000 metric tons of Canada's total European exports of 400,000 metric tons. Finland is Canada's biggest competitor for European and world markets for newsprint, selling 628,000 metric tons in Europe, largely to West Germany (198,000 metric tons) and the United Kingdom (176,000 m.t.). In every area of the world, except Europe, Canada outsells her competitors.[7]

Here again the U.S. and European markets appear to have the best prospects for long run growth in the light of efforts to become self sufficient by most other countries. However, considerable difficulties face the tropical regions of Africa South and Central America, and Asia, before they will become self sufficient in newsprint and hence those regions can be

TABLE 2-1

WOOD PULP PRODUCTION AND APPARENT CONSUMPTION (DERIVED BY SUMMING PRODUCTION AND IMPORTS AND REDUCING THE TOTAL BY EXPORTS) FOR EUROPE AND NORTH AMERICA, 1956-65, IN '000 METRIC TONS.

	EUROPE		NORTH AMERICA	
Year	Total Production	Apparent Consumption	Total Production	Apparent Consumption
1956	13,659	13,474	29,815	29,369
1957	14,332	14,390	29,235	28,564
1958	14,255	14,294	28,970	28,447
1959	15,301	15,223	31,893	31,345
1960	17,082	17,536	33,364	32,187
1961	18,096	18,720	34,636	33,261
1962	18,346	18,746	36,327	35,131
1963	19,605	20,295	38,642	36,909
1964	21,372	22,168	41,872	39,878
1965	22,533	23,162	43,071	41,171
% Increase	65%	72%	44%	40%

Source:- Consumption data are derived from production, imports and exports data obtained from: F.A.O., Yearbook of Forest Products Statistics, Rome, 1966, pp. 2-7. Relevant sections are reproduced as Appendix I to this thesis.

expected to present a growing market for newsprint for some years to come.

Newsprint, being a finished product, contributes all its value added to the income of the exporting country and is therefore a highly desirable export, and great effort is justified in finding and developing customers for newsprint.

Newsprint has a long history as one of Canada's leading export commodities. Table 2-2 on page 19, shows a part of this history, and for comparison the performances of wood pulp, wheat and Canada's balance of trade. The table emphasizes the importance of newsprint exports to Canada's balance of trade.

Correlation analysis by the U.N., has shown a marked correlation between per capita consumption of paper and board and per capita national income.[8] Applying this correlation in the special case of newsprint, it would appear that the consumption of paper increases with population growth and with economic development. However the markets expected in developing countries are likely to be marred by foreign exchange difficulties which would tend to encourage development of paper producing industries within those markts wherever possible.

Fibreboard.[9]

F.A.O. defines fibreboard as follows:[10]

> "A sheet material manufactured from fibres of wood or other ligno-cellulosic materials, with the primary bond deriving from the arrangement of the fibres and their inherent adhesive properties. Bonding agents or other materials may be added during manufacture to increase strength or resistance to moisture, fire, insects or decay, or to improve some other property of the product. (Similar products made from pieces of wood or pieces of other ligno-cellulosic material or from wood flour with added binders are excluded as are boards of gypsum or other mineral material.)"

TABLE 2-2

CANADIAN BALANCE OF TRADE, EXPORTS OF OWN MANUFACTURE, NEWSPRINT, WOOD PULP AND WHEAT, IN MILLIONS OF DOLLARS. 1939-1964.

Year	Newsprint ($000,000)	Woodpulp ($000,000)	Wheat ($000,000)	Total Exports of own Manufacture ($000,000)	Balance of Trade ($000,000)
1939	116	31	109	925	+ 185
1940	151	61	120	1,179	+ 111
1941	154	86	162	1,621	+ 191
1942	141	95	122	2,364	+ 741
1943	145	100	235	2,971	+1,266
1944	157	102	384	3,440	+1,724
1945	180	106	476	3,218	+1,682
1946	266	114	250	2,272	+ 458
1947	342	178	265	2,753	+ 247
1948	383	212	243	3,052	+ 468
1949	434	171	435	2,975	+ 290
1950	486	209	325	3,104	+ 17
1951	536	365	441	3,897	- 59
1952	592	292	621	4,282	+ 421
1953	619	249	568	4,097	- 96
1954	636	271	375	3,860	- 42
1955	666	297	338	4,258	- 240
1956	708	305	513	4,760	- 713
1957	715	292	380	4,789	- 589
1958	690	285	446	4,791	- 156
1959	722	311	442	5,022	- 369
1960	758	325	410	5,256	- 96
1961	761	347	663	5,755	+ 127
1962	753	370	602	6,179	+ 90
1963	760	405	787	6,799	+ 422
1964	834	461	1,023	8,094	+ 815

Note: (+ exports exceed imports)

Source:- Canada, D.B.S., Canada Yearbook.

In 1965, the fibreboard export market was dominated by Sweden (394,000 m.t.) followed by Finland (143,000 m.t.), Norway (55,100 m.t.) and Canada (52,600 m.t.). Canada imports fibreboard from every region (total 22,100 m.t. in 1965) although only in small quantities compared with the United Kingdom (249,200 m.t. in 1965) and the United States (220,300 m.t. in 1965).

The fibreboard market appears to be a neglected area in the Canadian industry. While the U.S. (2,066,600 m.t.) and Europe (2,534,000 m.t.) dominated the world for production of fibreboard in 1965 (total for world 6,112,000 m.t.)[11] Canada produced only 254,000 m.t. An investigation of tariffs is warranted to determine whether there are impediments to developing an export market resulting from undue protectionism by European countries and/or the U.S.

The U.S. both imports and exports fibreboard, importing 220,300 m.t. in 1965 of which 55,200 m.t. came from Canada and exporting 26,400 m.t. in 1965 of which 10,200 m.t. went to Canada. It would appear that in the U.S. there is quite a large market for Canadian fibreboard.

The 1966 Yearbook of Forest Products Statistics of the F.A.O. gives direction of trade data for 1965. From this data it can be shown that in 1965 exports of fibreboard to non-European countries from Europe were 242,400 metric tons. Thus Europe is an apparent net exporter of fibreboard and is finding export markets receptive to the European product. Total European exports of fibreboard were 891,000 m.t. in 1965, while imports amounted to 734,000 m.t. Thus there is considerable inter-

regional trade in Europe in fibreboard.

Further data on Europe gives an indication of the growth of the European market for fibreboard.[12] In the period 1949-51 Europe imported an average 155,000 m.t. of fibreboard per year. (note that this figure includes trade between European countries.) In the period 1959-61 the figure was 549,000 m.t. Estimating from the 1966 Yearbook of Forest Products Statistics[13] the comparable figure for 1964 would be 731,000 m.t. as given in the summary tables. This last figure is unlikely to be strictly comparable to the previous two figures, however it does indicate the continued growth of this market in Europe.

These figures suggest that there is a fibreboard market in the U.S. and Europe especially, which Canadian producers are failing to reach.

However, for Canada, the export of fibreboard does have some drawbacks. First, it appears that the pulp furnish required for production of fibreboard is not critical concerning the use of long-fibre coniferous pulps or short-fibre broadleaved or hardwood pulps. Therefore, Canada's advantage in having available large supplies of long-fibre pulps, which is the mainstay of her superiority in the newsprint and paper-board markets, is lost.

In considering an expansion of fibreboard production in Canada, attention must be paid to possible repercussions that this expansion might have on other Canadian products. Two points must be considered. First is the impact on pulpwood costs that is likely to arise from an expansion of fibreboard production. Second is the nature of the market for fibreboard

and possible repercussions on markets for other Canadian products.

According to F.A.O.[14] the species used in fibreboard production in North America vary in each region. In the Pacific region, which includes British Columbia, species used include Douglas fir, Sitka spruce, western hemlock, lodgepole pine, ponderosa pine, western red cedar, white fir and redwood, with very small quantities of broadleaved woods. However in the Great Lakes area considerable quantities of broadleaved woods are used in the production of fibreboard. Species used in the Great Lakes area include the coniferous red, white and black spruce, balsam fir, Jack pine and eastern white pine and the broadleaved aspens or poplar. In southern and south-eastern U.S.A. species used include longleaf, shortleaf, loblolly and slash pines, sweetgum and black willow. Thus it can be seen that the production of fibreboard is possible from a great variety of both coniferous and broadleaved woods. In fact F.A.O. lists 30 coniferous and 43 broadleaved species commonly used in fibreboard manufacture. Included are 3 species of poplar and 2 species of aspen. It is important to consider the likely effect of an expansion in demand for pulpwood for fibreboard manufacture on pulpwood prices. Any effect likely to raise the price of pulpwood to newsprint manufacturers would be of special importance to Canada due to the large export earnings and the competitiveness of the newsprint industry. It could very well be that increased fibreboard manufacture might indirectly raise costs in newsprint manufacture so that Canadian producers would suffer an erosion of their competitive position in export markets.

Table 2-4 shows that newsprint manufacture is expected to require approximately 77 parts by weight of groundwood pulp per 100 parts of newsprint produced by 1975. Hence any rise in price of pulpwood species suitable for groundwood pulp production would have important ramifications upon the cost of production of newsprint.

Species suitable for the production of mechanical pulp are given by the Forestry Branch[15] as spruce, true fir, Jack pine, western hemlock, and eastern hemlock. All of these woods, with the exception of eastern hemlock are mentioned by F.A.O. as being used in fibreboard production.

One species in particular stands out as being available for fibreboard production while not being suitable for mechanical pulp production. That species is the group known as aspen or poplar. Also the great variety of species suitable for producing fibreboard may make competition for raw materials by fibreboard and newsprint manufacturers of little consequence.

New facilities for production of fibreboard will attempt to find raw materials with the lowest possible cost delivered to the mill, especially since wood costs make up a considerable portion of the cost of pulp production.[16] One of the factors which would then have to be taken into account is the price of pulpwood. It would seem good practice for a prospective operator to design production facilities to use a raw material for which there is unlikely to be significant demands from other operations. This is so for two related reasons. First, if significant demands are currently being made upon a particular species for pulpwood then its price can be expected to be

higher than the price of other species for which there is not such a heavy demand. This argument assumes roughly equal abundance and accessibility of each species and depends on finite quantities of each being available for utilization. Under this assumption price will reflect the relative urgency of needs of purchasers of the species. Hence a species for which no demand or very little demand is currently being expressed can be expected to come onto the market in response to a new demand, at a low price, provided sufficiently large quantities of it are available to satisfy that new demand without serious depletion of the species. Secondly, again assuming roughly equal abundance of the two species, additional demand for a species currently meeting significant requirements for other uses will result in a higher price for that species. Hence in the long run, not only should the initial price of the unutilized species of pulpwood be low but the price of pulpwood should remain low for that species already under significant utilization.

It would appear then that, in Canada, competition for pulpwood is unlikely to develop between fibreboard and newsprint manufacturers, unless no species not required by newsprint manufacturers in large quantities is available. Canada, however, does have species of timber which are not required for newsprint production and these are available widely distributed throughout the country. Most obvious of these is poplar.[17] Hence we may state that development of fibreboard production in Canada is unlikely to have a large effect on pulpwood prices paid by newsprint mills.

A second difficulty may arise from the markets in which fibreboard will be sold. Displacement of lumber sales may be detrimental to the Canadian lumber industry especially if such displacement were to occur in Canada's export markets in the U.S. and the United Kingdom.

According to F.A.O. fibreboard has found its major market in building construction.[18] In this area house building has provided many uses for the product in its various forms. Hence fibreboard, in use as siding, insulation, roofing and many other house building requiremants is effectively displacing lumber, where the special properties of fibreboard better suit the situation. Thus as siding, fibreboard not only performs the physical requirement but provides also for a considerable amount of the insulation required. Generally where large areas need to be covered, fibreboard can find a market in substitution for other panel products.[19]

Thus the possibility of competiton with lumber and plywood needs to be given consideration. As a structural material it would appear that fibreboard certainly poses no threat of substitution for lumber. Where panels and large flat areas are needed, however, fibreboard presents good competition to lumber and plywood. This competition is intensified by the fact that fibreboard prices have fallen both absolutely and relatively with respect to those for lumber.[20]

It would appear then, that fibreboard can be expected to fill a variety of needs to which it is most suited, over the long run. Many of these uses can be expected to detract from markets currently filled by lumber (e.g. siding) and

plywood (e.g. some panel uses such as appliance backs). However, the effect appears to be one of replacement of these products in their marginal uses rather than complete displacement of either lumber or plywood.

One further comment needs to be made here in regard to the situation in regard to raw materials. F.A.O.[21] reports that Europeean fibreboard producers are facing increased competition for raw materials from other pulp and paper producers. However, the situation in Canada is somewhat different due to the almost complete utilization of Europe's forest resources compared with the low degree of utilization to which Canada's forest resources are presently subject.[22]

Notwithstanding the above arguments, Canada does have an advantage of scale, already having large, high-capacity pulp manufacturing capability, to which the addition of fibreboard capacity would mean simply diversification of product and utilization of screenings fibre. Also, although fibreboard may replace lumber in many of its traditional markets, it uses a lower value, smaller growth, raw material and may contribute to the maintenance of quality in lumber by allowing the lumber industry to use only the larger, high-valued growths.

Other Sources of Coniferous Timber.

With respect to the general situation for Canadian exports it should be noted that although Canada has large reserves of coniferous forests, she does not have the only ones available and new plantation growth elsewhere promises to be highly productive. Apart from the extensive coniferous forests in the U.S.S.R., Brazil and Central America, large scale

afforestation programs undertaken with exotic conifers in Chile, South Africa, New Zealand, Brazil, East and Central Africa, and Australia have shown exceptionally high rates of growth, as witness the growing exports of wood pulp by New Zealand and South Africa from plantations established in the 1930's. According to F.A.O. again -- "their potential long-term significance may be considerable"-- after the period up to 1975.[23] However, these producers may encounter difficulty entering the U.S. market at present served largely by Canada.

In this connection it must be realized that, unlike these regions, Canada is not free to choose a fast growing species without regard to its natural suitability. The severity of weather conditions in Canada limit her forests to a few species adaptable to Arctic and Sub-Arctic conditions.

It is important, at this stage, to consider the ability of European producers to meet projected future requirements for pulpwood. The following discussion is drawn from studies made by F.A.O. on the situation of the pulp and paper industry in Europe.[24]

F.A.O. has explained that the development of European wood production[25] has resulted from a relative lack of forest resources. In percentage of area covered by forests Europe, having 28 percent, has quite considerable resources in comparison to a world average figure of 29.4 percent. However, in area of forest per capita Europe's forests are insufficient, being only 0.3 hectares per head as compared with 0.4 for Asia, 3.5 for North America and 6.5 for the U.S.S.R.

This relative lack of resources is counteracted by several

factors. First explains F.A.O., Europe's per capita consumption of pulp products remains lower than that in North America. (44 kg. per capita per year in Europe in 1956 as compared with 182 kg. in North America) Secondly virtually all of Europe's forested areas are productive and accessible, and virgin forest is no longer available. Third, a high percentage of Europe's forested area is composed of valuable coniferous woods (70 per-cent). Finally, European forests have a history of sound management backed by legislation.

A later study[26] compares projected required removals with projected availability of roundwood in Europe. For 1975 they arrive at a short-fall of 70 million cubic metres from a projected requirement of 340 million cubic metres. This gap is expected to be reduced by more intensive forest management and diversion of fuel wood to industrial use with increasing prices reducing the level of demand projected.

Wood costs in 1958 in Finland are compared with those in the U.S. in 1959 in Table 2-3, page 29. Since this time F.A.O. has noted increasing costs in Finland. Also central European mills faced much higher wood costs than Finland ($20-$25 per cubic metre for delivered pulpwood) in the late fifties and early sixties according to F.A.O.

Thus it would seem that if Canada's wood costs do not rise at the same rate as Europe's, Canadian wood pulp may find a small but growing market in Europe. Naturally, the further proviso must be that restrictive tariffs are not erected to prevent imports of pulp. F.A.O. considers the erection of these tariffs to be likely in the economic communities of Europe.

TABLE 2-3

WOOD RAW MATERIAL COSTS AT THE MILL IN FINLAND IN 1959 AND IN THE UNITED STATES IN 1958. (U.S. $ PER CUBIC METRE SOLID MEASURE WITHOUT BARK.)

Finland (1959)	$ per cubic metre
Spruce pulpwood	11.00
Aspen pulpwood, sulphite mills	8.50
Pine pulpwood, sulphate mills	10.60
Sawmilling residues, sulphate mills	8.70
Birch pulpwood, sulphate mills	9.60
Pulpwood for sulphate mills, average	9.70
Sawmilling residues, fibreboard mills	7.10
Pine sawlogs	11.00
Spruce sawlogs	11.30
United States (1958)	
Coniferous pulpwood (average)	9.00
Spruce and true fir	12.90
Hemlock	9.80
Jack pine	9,60
Southern pine	8.20
Broadleaved pulpwood (average)	7.30
Northern species (mixed)	7.80
Poplar	8.50
Southern species (mixed)	6.50

Note: Converted from the data in official statistics of of Finland and from the wood pulp statistics of the U.S. Pulp Products Association.

Source:- U.N., Food and Agriculture Organization, European Timber Trends and Prospects, A New Appraisal 1950-1975, New York, 1964, p. 107, Table 8.

In the long run European wood production is expected, by F.A.O., to be increased by the conversion of marginal and arable agricultural land to forest use under intensive management. Again costs may rise to make Canadian woodpulp attractive to European paper producers.

In the long run, then, it would appear that markets will develop slowly at first in Europe as local production of pulpwood continues to expand. Eventually however, it seems that an expansion of these markets must occur under two essential provisos. First the absence of tariff barriers against Canadian woodpulp, and second a lower rate of growth of wood costs in Canada than in Europe.

The data in Table 2-3 of course are not entirely representative. For the purpose of a general assessment of market opportunity in Europe for Canadian wood pulp, the Finnish data have been taken as representative of Europe. This is not so, as Finnish producers appear to be more efficient than other European producers. Similarly, the United States data shown have been taken as representative of North America. In this case it is difficult to show whether or not the data are representative. Since the object is only to make a general assessment of markets, the conclusions drawn depend only on the relationship between costs and not on their absolute values. For these purposes the data are adequate.

Canada's Markets in North America

Internal trade in Canada is more difficult to trace than world trade patterns. Indeed the only provincial imports and exports recorded are those which cross an international boundary.

For this reason it has not been possible to present an accurate picture of the patterns of trade in pulp and paper in Canada. Provincial exports are available but have not been reproduced because they are weighted according to the number of major outlets to the United States and thus provide a misleading picture.

Directions of trade within Canada seem impossible to discover. Collected data applies only to international trade and the credit for the trade is given to the Province in which the port of exit is situated. Hence British Columbia, Manitoba, Ontario and Quebec dominate the trade figures for Canadian provinces. Thus, to develop figures, from the collected data, for distance to major markets within Canada seems futile.

Newsprint and fine papers are used in serving individuals, and thus it can be expected that markets for these products will develop where large populations live. Of course, the presence of a large population does not by itself indicate the existence of a large market for newsprint and fine papers. There must also be a significant consumption of these products per head of population, a factor which depends upon personal income and literacy, and possibly the attitude of the population towards use of newsprint and fine papers. Hence the large urban populations of cities in India are not indicators of large markets for newsprint and fine papers due to the low levels of income and, as yet, low rate of literacy found in India. Similarly large urban populations in Western Europe can be expected to indicate smaller markets for newsprint and fine papers, than their counterparts in North America because per capita consumption of paper is lower in Europe than in North

America (44 kg. per head per year in Europe in 1956 as compared with 182 kg. in North America).

The following tables present, first the regional break-down of the United States used in preparing the data which follow, second, population growth and personal income information for the United States and, third, similar material for Canada. The materials are not for the same years in either country and the periods for which rate of population growth has been calculated are also different. However, the object of the tables is to point out areas where large markets for newsprint and fine papers can be expected, and not necessarily to rank these markets for any particular year.

The tables show that the Mideast, Great Lakes, South east and Far West regions of the United States and the provinces of Quebec and Ontario in Canada, have characteristics of population and income which lead to the expectation of large present markets for newsprint and fine papers with prospects of future growth.

Areas which show prospects for future development into large markets for newsprint and fine papers are the South west and New England states and possibly the Plains states. The Plains region shows the lowest overall rate of increase in population for regions in the United States, but is relatively compact as compared with the South east region. Its prospects as a market depend on its performance in attracting population. British Columbia might be considered as part of the growing Far West regional market.

TABLE 2-4

REGIONAL BREAKDOWN OF THE UNITED STATES USED BY THE OFFICE OF BUSINESS ECONOMICS.

REGION	STATES
New England	Maine New Hampshire Vermont Massachusetts Rhode Island Connecticut
Mid East	New York New Jersev Pennsylvania Delaware Maryland District of Columbia
Great Lakes	Michigan Ohio Indiana Illinois Wisconsin
Plains	Minnesota Iowa Missouri North Dakota South Dakota Nebraska Kansas
Southeast	Virginia West Virginia Kentucky Tennessee North Carolina South Carolina Georgia Florida Alabama Mississippi Louisiana Arkansas

(continued next page)

TABLE 2-4

REGION	STATES
Southwest	
	Oklahoma Texas New Mexico Arizona
Rocky Mountain	
	Montana Idaho Wyoming Colorado Utah
Far West	
	Washington Oregon Nevada California
Territory of Hawaii	

Source:- U.S. Department of Commerce, Office of Business Economics, U.S. Income and Output, U.S. Gov't. Printing Office, 1958, Table II-8, p. 157.

[illegible]

[illegible]

[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
	[illegible]
	[illegible]

[illegible]

TABLE 2-5

RATE OF GROWTH OF POPULATION, PERCENT, 1950 to 1960, AND TOTAL PERSONAL INCOME, 1955, and 1957, IN MILLIONS OF DOLLARS FOR THE UNITED STATES, BY REGIONS (AS DESCRIBED BY THE U.S. OFFICE OF BUSINESS ECONOMICS).

Region	Population Growth Rate 1950-1960 (percent)	Population 1960 (000's)	Personal 1955 (millions of dollars)	Income 1957 (millions of dollars)
New England	12.8	10,508	20,200	22,687
Mid east	12.6	38,479	78,014	87,901
Great Lakes	19.2	36,224	70,208	77,559
Plains	9.5	15,394	24,683	27,913
South east	12.8	38,753	47,154	53,088
South west	19.7	14,161	20,513	23,438
Rocky Mountain	19.3	4,317	6,670	7,731
Far West	29.0	20,624	39,156	44,955

Sources: Population data: U.S. Department of Commerce Bureau of the Cencus, <u>The Eighteenth Decennial Cencus of the United States</u>, Cencus of Population: 1960, Volume 1, Characteristics of the Population, Part A, Number of Inhabitants, Tables 10 and 15, pages 1-18 and 1-25.
Income data: U.S. Department of Commerce, Office of Business Economics, <u>U.S. Income and Output</u>, U.S. Gov't. Printing Office, 1958, Table II-8, p. 157.

TABLE 2-6

CANADA, POPULATION (JUNE 1, 1965) RATE OF GROWTH OF POPULATION, PERCENT (JUNE 1, 1964 to JUNE 1, 1965), AND TOTAL PERSONAL INCOME 1965 AND 1966 (MILLIONS OF DOLLARS) BY PROVINCES.

Province	Rate of Growth of Population June 1/64 to June 1/65 (%)	Population June 1/65 (000's)	Personal Income 1965 (millions of $)	Personal Income 1966 (millions of $)
Newfoundland	1.4	498	584	650
Prince Edward Isl.	0.9	108	148	150
Nova Scotia	0.1	761	1,130	1,197
New Brunswick	1.0	623	857	925
Quebec	1.7	5,657	9,926	10,830
Ontario	2.2	6,731	15,450	16,921
Manitoba	0.4	962	1,846	1,968
Saskatchewan	0.8	951	1,870	2,135
Alberta	1.3	1,451	2,867	3,243
British Columbia	2.9	1,789	4,080	4,539
Yukon and Northwest Territories	-2.0	40	60	64
Canada	1.7	19,571	38,902	42,712

Sources: Population data - Canada, D.B.S., Vital Statistics, 1965, Annual, Cat. No. 84-202, Queen's Printer and Controller of Stationery Ottawa, 1967, Table S2, p. 43.
Income data - Canada, D.B.S., National Accounts Income and Expenditure, 1966, Annual, Cat. No. 13-201, Queen's Printer and Controller of Stationery, Ottawa, 1967, Table 28, p. 36.

Alberta's Pulp & Paper Markets.

Pulp and paper find their markets at centres of population. Three regions then present themselves as major market areas in North America. They are the eastern seaboard market in the northeastern U.S. and eastern Canada, dominated by Montreal, Toronto, Boston and New York. The central market at Chicago and environs and the West coast market dominated by Los Angeles, San Francisco, Seattle and Vancouver. Chicago and the Lakehead also offer an overseas outlet. Also the prospective outlet through Prince Rupert, B.C. may develop.

Alberta faces stiff competition in whichever direction she decides to market. Large and established manufacturers exist in Ontario and Quebec and to some extent in Manitoba. Furthermore those areas enjoy direct access to major U.S. markets around New York and Minneapolis - St. Paul. However, Alberta's special raw material enables it to produce high grade bleached sulphate pulp which is readily marketable in these areas.

A similar situation exists in the Western states. Strong competition exists from British Columbia, Washington State and Oregon based manufacturers who have access to a wide variety of raw materials including lodgepole pine. Also the Rocky Mountains provide a barrier in terms of transportation costs which must be overcome by improved transportation technology, manufacturing economies and careful market specialization. Distance need provide no barrier to a product which uniquely meets special requirements in its market, but this places a limitation on the form of resource development which can be

promoted and also may limit expansion of the market.

The central states market for industrial paper at Chicago is limited in size although constantly growing. Yet, industrial concentration there provides a very large market for specialized industrial papers. The market is available on a competitive basis to Eastern producers and west coast producers via the Great Lakes and land routes. Alberta producers must use land transport for most of the journey. An opportunity exists in this market for the right product providing transportation costs can be controlled or counteracted by other economies. Penetration of these markets therefore depends upon the development of transportation technology.

The export markets available through the St. Lawrence Seaway and Prince Rupert are also by no means exclusive Alberta properties and even worse competitive problems must be met in those markets.

This superficial examination of possible markets reveals two points to be borne in mind when considering the exploitation of Alberta's forest resources. First many markets are available although none are necessarily captive and all are subject to strong, efficient competition from established producers. Hence the success of an Alberta venture depends upon careful product differentiation and vigorous marketing coupled with efficient manufacturing techniques. In other words, Alberta's entry into these markets requires high quality entrepreneurship and a careful examination of cost behaviour in the critical areas of transport, raw materials and mill capacities. Secondly Alberta has one slight competitive

advantage. It possesses large quantities of raw material capable of producing a premium product (bleached sulphate or kraft pulp). That is, the available raw materials point to an advantageous avenue for product differentiation.

Consumption Predictions for Pulp and Paper from the Literature

It is worthwhile to consider some of the available predictions of demand for wood products and especially for pulp and paper, in some major market areas.

The first study to come under consideration here is that of Landsberg, Fischman and Fisher performed for Resources for the Future.[27] This most thorough study, while not considering the effects that movements in the timber market might have on future timber consumption, carefully extrapolates historical trends to the year 2000 taking into account present and foreseeable changes in the patterns of use, and confronts this consumption figure with the resource availability which can be foreseen. The study makes liberal use of the U.S. Forest Service publication Timber Resources for America's Future.[28] Their projections of gross demand (or consumption) and imports for softwood and hardwood appear in the following table.

In considering the role of imports in meeting future requirements the study points out that Canada is undoubtedly the most promising source of supply and that in all likelihood Europe "is likely to compete with the United States for Canadian exports"[29]. Both for hardwood and softwood, the U.S. is likely to become even more dependent on Canada to make up the deficit in her supply of timber. This is the conclusion reached by a

TABLE 2-7

UNITED STATES GROSS DEMAND FOR ALL USES AND IMPORTS OF SOFTWOOD AND HARDWOOD FOR THE YEARS 1960, 1980 and 2000.

	1960		1980	2000
Gross demand for softwood (billion cubic feet)	8.3	L	9.1	11.2
		M	14.3	24.7
		H	20.4	48.1
Imports of softwood (billion cubic feet)	0.8	L	1.6	2.4
		M	2.0	3.0
		H	2.4	4.0
Gross demand for hardwood (billion cubic feet)	3.2	L	3.0	3.8
		M	4.4	7.6
		H	6.1	14.3
Imports (billion cubic feet)	0.08		0.14	0.20

L = Low projection M = Medium H = High

Source: Softwood--Landsberg, H.H., et al. op cit. Table 18-11, p. 361.
Hardwood--ibid., Table 18-13, p. 366.

study which considered maximum utilization of available resources, rather than utilization of only those resources likely to be called forth by the market. Hence the developing deficiency in the United States of wood fibre for current needs provides a most promising market for forest products from all of Canada, but the markets are highly structured by locational and resource factors.

Newsprint is the largest single pulp product produced in Canada and the United States imports of newsprint make up a considerable proportion of U.S. newsprint consumption. The

Landsberg study predicted newsprint imports into the U.S. as shown in Table 2-8, below.

TABLE 2-8

IMPORTS, CONSUMPTION, AND PERCENTAGES IMPORTED OF NEWSPRINT, PROJECTED FOR THE UNITED STATES FOR THE YEARS 1980 and 2000, AND ACTUAL DATA FOR THE YEARS 1950 and 1960.

Newsprint	1950	1960	1980	2000
Imports (mil. tons)	4.86	5.42	6.4	7.2
Consumption (mil. tons)	5.86	7.33	11.2	15.9
Percentage imported (%)	82.9	73.9	57	45

Source:- Landsberg, H.H., et al. op cit., Table 8-1, p. 172.

Of special interest is the absolute growth of imports projected along with greatly increased local capacity.

This point is also recognized by the Newsprint Association of Canada.

> "The massive increase in U.S. mill capacity which is planned for the southern and western states seems likely to add nearly 50 percent or a million tons of annual capacity during the years 1966-68. It cannot fail to provide a large part of the increase in demand which is in prospect during the next few years."30

The annual study of the Newsprint Association of Canada while of a very short term nature, also indicates the long run trend of Canadian consumption of newsprint paralleling the growth of consumption in newsprint in the U.S. Hence Canadian produced newsprint faces bright prospects for consumption, while

the detailed demand picture is clouded by persistent over capacity reported in the press[31] and by the Newsprint Association of Canada.[32]

Over capacity in newsprint presents a difficult problem for meaningful analysis. The evidence that overcapacity exists in North America is regularly published by the Newsprint Association of Canada. The association attempts to make its capacity data as comparable as possible to production figures, by eliminating from capacity, time spent producing other grades and time lost due to six-day weeks and other factors which affect capacity for newsprint production, but which do not represent, necessarily, a lack of demand for newsprint. The following data shows capacity and production over several recent years for both Canada and the United States.

In commenting on these tabulations the Newsprint Association of Canada points out that the Canadian data is probably more accurate than that for the United States since the Association had control over the construction of the Canadian data, but drew the United States data from reports of newsprint organizations in that country. It appears from inspection of this data that while newsprint producers have maintained a surplus of productive capacity, they have not allowed capacity to expand at a rate fast enough to widen the gap between capacity and actual production. The data indicates that the newsprint industry considers that operating rates greater than 80 percent are satisfactory since capacity has continued to increase in response to increasing requirements. It would appear that overcapacity is a poor way to state the situation for newsprint since the

TABLE 2-9

NEWSPRINT CAPACITY AND PRODUCTION OF FACILITIES IN THE UNITED STATES AND IN CANADA, 1955 to 1965, ANNUALLY, IN THOUSANDS OF TONS.

	CANADA			UNITED STATES		
Year	Capacity	Production	Operating Rate(%)	Capacity	Production	Operating Rate(%)
1955	6,064	6,191	102.1	data not available		
1956	6,243	6,469	103.6	"	"	"
1957	6,756	6,397	94.7	"	"	"
1958	7,239	6,096	84.2	"	"	"
1959	7,521	6,394	85.0	"	"	"
1960	7,611	6,739	88.5	2,399	2,038	85.0
1961	7,734	6,735	87.1	2,376	2,094	88.0
1962	7,844	6,691	85.3	2,471	2,154	87.2
1963	8,055	6,630	82.3	2,461	2,218	90.1
1964	8,274	7,301	88.2	2,469	2,261	91.6
1965	8,421	7,720	91.7	2,497	2,180	87.3

Source:- Newsprint Association of Canada, Newsprint Data: 1966, Newsprint Association of Canada, Montreal, November 1966, Table 15 and Table 20, pp. 16 and 19.

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industry seems to be treating such excess capacity as does exist as a reserve rather than as a dangerous element indicative of the state of the market.

One must also be mindful of the fact that much of the newsprint production capacity is owned by the buyers; and therefore this is not strictly a normal market situation with independent buyers separated from independent sellers.

Overcapacity has also been noted in the production of kraft pulp and papers[33] even though sales of both kraft papers have shown steady gains after allowing for seasonality.

Overcapacity has also been noted for market pulps in

the special case of the market available to producers located in Canada's central forest.[34] In this particular case the producers based in the Canadian prairies are faced with negligible local demand, eastern and western seaboard markets closed by local producers and "tied" mills and slowly growing markets in the central United States due also to strong competition from seaboard mills. The seaboard mills are pointed out to be strong competitors due to savings available on inwards transportation of pulpwood to the mill. In this case Mr. Collinge concludes investment in market pulp production presents unattractive prospects for independent investors.

The Stanford Research Institute, in 1954 published a report for the Weyerhaeuser Timber Company titled America's Demand for Wood, 1929-1975.[35] This study attempted to foresee the effect of price movements on timber commodities and is thus much more price conscious than the study by Landsberg and associates cited above. Projections are made using multiple linear regression on variables obtained for the period 1929 to 1952. Because of the inclusion of the depression at one end and a World War in the data period the results of these regressions must be approached with a certain amount of caution. However, the effect of the depression has to some extent been dampened by the use of gross national product or some related value as an independent variable in most cases. The effect of the war however has not been eliminated and one of the basic assumptions made is that "there will be no all-out war during the period covered by this study".[36]

Treating consumption predictions for pulp and pulp

products is complicated by the diversity of possible measures which could be used. The choice of unit should take into account the aim of this study to arrive at the most efficient use of resources in Alberta. With this objective in view the best presentation of results would be in pulpwood measures along with at least current if not future values of that pulpwood in that use. However predictors naturally abhor predicting price levels as well as consumption because even the prediction of consumption is fraught with dangers let alone predicting concomitant price levels. For this reason then no price levels can be included here, but indication of the comparative values added of the various pulp products can be made from historical values. The following table developed from the report of the Stanford Research Institute lists increases predicted for all pulp products in millions of tons unless otherwise stated.

This study[37] predicts a slow reduction in exports of pulpwood from eastern Canadian provinces to the United States and expects a net reduction in spite of possible increases in exports from British Columbia. However this need not be dismaying since it is a primary product that is affected and the market for secondary wood products continues to grow as shown in the tables.

The only secondary wood product which the Stanford Research Institute study actually cites as an increasing export market for Canada is that of newsprint, that study not being primarily an examination of Canada's export prospects.

It is interesting to note which pulp commodities are predicted to increase in usage and to consider the values of

TABLE 2-10

ACTUAL AND PREDICTED UNITED STATES CONSUMPTION OF GROUPS OF PULP PRODUCTS FOR 1952, 1960, 1965, 1970, 1975 and 2000.

Product	Actual 1952	Predicted 1960	1965	1970	1975	2000
		(millions of tons)				
Building Board	1.31	2.10	2.60	3.10	3.60	6.10
Containerboard Total solid fibre and corrugated	5.60	7.4	8.5	9.6	10.7	16.1
corrugated	5.293	6.675	7.764	8.993	10.175	16.100
solid fibre	.368	.356	.348	.326	.313	.390
Boxboard	3.90	5.0	5.7	6.4	7.1	10.6
Fine Paper	1.25	1.6	1.8	2.0	2.3	3.4
Coarse Paper	3.12	3.8	4.2	4.6	5.0	7.0
Newsprint	6.03	6.7	7.3	7.9	8.6	11.8
Printing paper other than Newsprint	3.37	4.2	4.8	5.4	6.0	8.8
Tissue Paper	1.34	2.0	2.3	2.6	3.0	4.7
Building Paper Estimate #1 Pop., Disp. Inc., Trend	1.29	1.80	2.10	2.40	2.70	4.28
		(Thousands of Tons)				
Rayon & Acetate	608	981	1,172	1,372	1,571	2,555

Source: Stanford Research Institute, America's Demand for Wood, Report to Weyerhaeuser Timber Company, Tacoma, Washington, 1954., pp. 289, 275, 266, 262, 297.

TABLE 2-11

EXPECTED PULP FURNISH BY 1975 FOR VARIOUS TYPES OF PRODUCT, BY WEIGHT.

Type of Product	CLASS OF PULP						
	Total	White	Unbleached sulphate	Semichemical	Groundwood	Defibrated and Exploded	Screenings
Paper							
Fine	0.85	0.73	0.02	0.10			
Newsprint	1.05	0.18		0.10	0.77		
Book & Printing	0.85	0.39	0.01	0.15	0.30		
Coarse	1.00	0.24	0.68	0.05	0.01		0.02
Sanitary tissue and other	0.99	0.71	0.04	0.05	0.19		
Paperboard							
Containerboard	0.72		0.51	0.20	0.01		
Boxboard & other	0.40	0.23	0.03	0.10	0.03		0.01
Building Materials							
Building Paper	0.45		0.06	0.08	0.01	0.28	0.02
Building Board	0.95		0.10		0.20	0.65	

Source: Stanford Research Institute, America's Demand for Wood, Report to Weyerhaeuser Timber Company, Tacoma, Washington, 1954, pp. 313.

these commodities in Canada in recent years.

Values for Alberta are not disclosed since this would involve divulging statistics of individual establishments. Hence the only provinces for which the D.B.S. provides data are Quebec, Ontario and British Columbia as well as all of Canada figures. Table 2-12 shows shipments, values and derived unit prices for Canada in 1964.

Table 2-12 shows that the high value products are those containing white pulps. It should parenthetically be noted that bleached sulphate pulp from jackpine and lodgepole pine sells at a premium in the white pulp market due to its superior bleaching qualities. This factor has already influenced the production of the one Alberta pulp mill now in operation.

Alberta and the Pulp and Paper Markets.

This chapter has discussed the markets which exist for pulp and paper and their prospects for expansion. The discussion points to considerable expansion in the consumption of most pulp and paper. Markets that are presently available have prospects of expansion in the future and currently small markets show signs of developing into significant consuming areas in the future.

These conclusions, however, are general and their optimistic note needs considerable modification when these same markets are examined from Alberta's point of view. In order to appraise these markets in regard to Alberta it is necessary to begin at the present general description of Alberta's economy. Alberta is predominantly engaged in agriculture and

TABLE 2-12

CANADIAN MILL SHIPMENTS, VALUES AND DERIVED UNIT PRICES OF VARIOUS PULPS AND PULP PRODUCTS FOR THE YEAR 1964.

Product	Quantity Tons	Value $'000	Unit Price($)
Pulps			
Dissolving & special "Alpha" (sulphite & sulphate)	439,673	74,913	$170.38
Sulphite, paper grades	1,140,705	135,672	118.93
bleached	797,339	99,642	124.96
unbleached	343,366	36,030	104.93
Sulphate, paper grades	2,403,361	306,065	127.34
Bleached	1,680,823	228,596	136.00
semi-bleached	321,422	38,077	118.46
unbleached	401,116	39,392	98.20
Groundwood			
bleached & unbleached	321,401	21,968	68.35
Screenings, Chemical & mechanical	27,644	666	24.09
All other wood pulp (incl. soda)	79,002	9,220	116.70
Papers			
Newsprint	7,377,967	887,612	120.30
Book & Writing (incl. Fine papers)	490,838	138,157	281.37
Wrapping Paper (coarse)	342,155	76,432	223.48
Tissue Paper (includes sanitary)	84,202	20,591	245.13
Paper boards (incl. wet machine boards)	1,296,691	187,772	144.77
Other paper (special industrial papers & building paper)	97,741	8,444	86.16
Building boards (fibre boards) Softboard, rigid insulating, homogeneous & laminated	26,620	208,334	127.98

TABLE 2-12

Product	Quantity Tons	Value $'000	Unit Price($)
Papers			
Hardboard	85,665	10,785	125.40

Source: Dominion Bureau of Statistics; Pulp and Paper Mills, Annual, Catalogue No. 36-204, 1964, Tables 13A, 13C and 13D (Mill Shipments), pp. 17, 18, 19.

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mineral extraction. A pulp and paper economy does not exist in Alberta at the present time, although one firm produces pulp and a large quantity of raw materials exist for the industry.

In order for Alberta to develop a pulp and paper economy it is not sufficient simply to look at the pulp and paper markets available. Once having established the location and restrictions of the market it is necessary to examine the difficulties Alberta will face in attempting to sell in these markets. Thus available raw materials, critical cost items and the potential market available to Alberta must be considered.

The nature of the raw materials available in Alberta places restrictions on the product which can be produced. The large quantity of lodgepole pine available in Alberta points to a large capability for producing bleached sulphate pulp, a product which can be produced in particularly high quality from this species. The market which should immediately come under consideration is that for white pulp.

Referring back to Table 2-11, white pulp is seen to have

uses in the production of fine paper, newsprint, book and printing paper, coarse paper, sanitary tissue and boxboard. It makes up the largest part of the furnish for fine paper, sanitary tissue and boxboard.

Having established the products to be served either by selling of pulp to other manufacturers or by complete production in Alberta, it is necessary to consider costs. Can Alberta produce white pulp or white pulp products and sell them in distant markets competitively? In order to answer this question it is necessary to assess costs not only in Alberta, but in competing areas. This is the object of the next chapter.

Such factors as the relative weights of product and raw materials must be taken into account since transport plays a large role in getting Alberta's products to market.

Alberta cannot hope to develop a pulp economy without careful examination of available raw materials, local costs relative to those encountered in competing areas and available markets. Disadvantages which arise may then be examined in order to assess whether aggressive marketing* and careful product differentiation coupled with efficient production can overcome them.

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* By aggressive marketing is meant the practice of actively seeking out potential users of a product whose characteristics can be supplied by the product sold. This is done by emphasizing the best qualities of the product. For example, Alberta's present bleached sulphate wood pulp is sold as ... "The whitest white you've ever seen!"

REFERENCES

1. F.A.O., Yearbook of Forest Products Statistics, Rome, 1966, pp. 86, 87.
2. F.A.O., European Timber Trends and Prospects, A New Appraisal, 1950-1975, New York, 1964, p. 203.
3. F.A.O., Yearbook of Forest Products Statistics, Rome, 1966, pp. 104-107
4. F.A.O., European Timber Trends and Prospects, A New Appraisal, 1950-1975, New York, 1964, p. 203.
5. F.A.O., European Timber Trends and Prospects, A New Appraisal, 1950-1975, New York, 1964, ch. 24.
6. F.A.O., Yearbook of Forest Products Statistics, Rome, 1966, p. 108-111.
7. Areas as used by F.A.O. in its Yearbook of Forest Products Statistics, ibid.
8. F.A.O., Possibilities for the development of the Pulp & Paper Industry in Latin America, United Nations, New York, 1950, available in Streyffert, Thorsten, World Timber, Trends, and Prospects, Almgvist & Wiksell, Stockholm, 1958, p. 103.
9. F.A.O., Yearbook of Forest Products Statistics, Rome, 1966, p. 112-115.
10. Ibid., p. 129.
11. Ibid., p. 37.
12. F.A.O., European Timber Trends and Prospects, A New Appraisal 1950-1975, New York, 1964, p. 199.
13. Op cit., p. 112-115.
14. U.N., Food and Agriculture Organization, Fibreboard and Particle Board, Rome, 1958, p. 34.
15. Canada, Forestry Branch, Canadian Woods, Queen's Printer and Controller of Stationery, Ottawa, 1951, p. 51.
16. Ibid., p. 95.
17. Canada, Forestry Branch, Canadian Woods, op cit., p. 45.
18. U.N., Food and Agriculture Organization, Fibreboard and Particle Board, op cit., pp. 111, 112.

19. Ibid., pp. 111-119.

20. Ibid., p. 22, Table 13.

21. F.A.O., European Timber Trends . . ., op cit., pp. 114-115.

22. For Europe see U.N. F.A.O. World Pulp and Paper Resources and Prospects, op cit. The Canadian situation is well put in the Final Report of the Royal Commission on Canada's Economic Prospects which is cited later in this study.

23. F.A.O., European Timber Trends & Prospects, op cit.

24. Studies seen are U.N., F.A.O., World Pulp and Paper Resources and Prospects, New York, 1954, which contains discussion of Europe; U.N., F.A.O., European Timber Trends and Prospects, A New Appraisal 1950-1975, New York, 1964, on which this section has drawn; and the U.N. publication of the same major title published in 1953.

25. U.N. Food and Agriculture Organization, World Pulp and Paper Resources and Prospects, New York, 1954.

26. U.N. Food and Agriculture Organization, European Timber Trends and Prospects, A New Appraisal 1950-1975, New York, 1964.

27. Landsberg, H.H., L.L. Fischman, and J.L. Fisher, Resources in America's Future, Resources for the Future, The Johns Hopkins Press, Baltimore, 1963.

28. United States Department of Agriculture, Forest Service, Timber Resources for America's Future, Forest Resource Report No. 14, Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C., 1958.

29. Ibid., p. 368.

30. Newsprint Association of Canada, Newsprint Data, 1965, Montreal 1965, p. 7.

31. Financial Post, "Pulp mills sprouting too fast?" June 17, 1967, p. 22.

32. Newsprint Association of Canada, op cit., p. 17.

33. Financial Post, op cit.

34. H.K. Collinge, "Reflections on the Forests of Canada in Relation to Northern Development", Unpublished manuscript of a speech made available by North West Pulp and Power -----, Hinton, Alberta, 1961.

35. Stanford Research Institute, America's Demand for Wood, Report to Weyerhaeuser Timber Company, Tacoma, Washington, 1954.

36. Ibid., p. ii.

37. Stanford Research Institute, op cit.

CHAPTER III

FACTORS AFFECTING COSTS IN THE PULP AND PAPER INDUSTRY IN ALBERTA

The presence in Alberta of vast unexploited forest lands prompts enquiry into the reasons for this lack of exploitation. Of prime importance, in making this enquiry in the particular case of the pulp and paper industry, is a discussion of the costs this particular industry might be expected to incur in Alberta. It is therefore important to examine the costs of pulp and paper production in terms of their characteristics and determination and also their size relative to other regions in Canada and North America.

The first and probably most important cost considered here is the general group known as 'wood costs'. Wood costs consist of all costs incurred in obtaining and delivering wood to the mill, including stumpage prices, logging costs and inward transportation.

Manufacturing or processing costs are then considered although it is assumed that no important differences can be expected in these costs, resulting from a decision to locate in Alberta.* Finally outwards transportation or distribution costs

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* This depends upon several factors since the assumption is made for all of Canada. Factors important to this assumption are the costs at the mill of chemicals and water, the extent of effluent treatment likely to be necessary, and the costs of labor and capital in the plant. Also costs will be affected by the size and capacity of the plant and its ability to produce a single product or a diversified range of products. The amount of utilized capacity likely also has an important bearing. The

are considered and their possible effects upon the Alberta based industry are discussed.

It would seem imperative at the outset to attempt a definition of stumpage and of stumpage price. A simple definition of stumpage would be the future felled log however, the precise definition of it, acceptable to all, is very cumbersome. Theoretically stumpage is a measure of the usable volume of wood felled in the log. But how is it to be measured? Cords, board-feet, tons, have all been used and are still used for measurement of stumpage. For example, in the north eastern United States there are twenty-three different log rules in use for the board-feet measurement of sawlogs, all yielding different values for the same logs![1] The problem is that stumpage is both a quantitative and qualitative measure. It includes only the sound and valuable wood in a log which will be recovered when the tree is felled and processed. The volume of valuable wood in a pile of logs is open to serious doubt, how much more difficult to measure then is the volume of valuable wood standing in a forest?

Stumpage price, to use a truism, is the price which must be paid for stumpage; that is the price of making the tree available for felling. It must take into account all values given up by felling the tree, including those which may have

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assumption is made on the basis that a new operation in Alberta would be able to take advantage of technology widely available in the industry. This should provide the ability to utilize any existing degree of substitutability existing between factor inputs. In this way newly established industry should be able to exercise considerable control over its manufacturing costs, a condition which does not apply to the location of markets, the pricing of stumpage or the initial quality of the forest.

been available by allowing it to stand until some future time. Hence the cost of growing the timber, as well as the market value of forest products, has an effect on stumpage prices. In virgin forests, where no sacrifice has so far been made to grow the timber, the marginal cost of allowing logging of the forest should generally, though not always be the determinant of stumpage prices. What determines this marginal cost? The obvious and major determinant is the value of the alternative uses to which the forest can be put, other than logging it for timber. Here the valuation of stumpage becomes even more difficult. What is the value of a forest for recreation, to the hunter, for wildlife conservation, for water conservation, for camping, and as a source of forage for both wildlife and marketable animals? It is obvious that the rational determination of stumpage prices presents a virtually impossible task if it is to be performed rigorously. However the market for stumpage resorts to a less rigorous but possibly no less rational method. It asks -- 'For what price is the owner of the forest prepared to give it over to logging?' Although the determination of stumpage prices in this manner constitutes use of a truism, it remains the only feasible method.

Pressures on Stumpage Prices: A case of Competing Demands

As society extends the use of forest resources, the marginal cost of placing forest resources under logging rises. Growth of population and urbanization makes society aware of the aesthetic and economic value of virgin forest resources as parks, wildlife reserves and water sheds. Also it appears that

the use of forest products in general grows as economic development progresses. Hence as requirements for consumption grow, so also do stumpage costs grow and there is a more or less constant upward pressure on stumpage prices.

The relationship of industrial wood consumption and economic development has been documented by F.A.O., especially for Europe[2]. They show that although the consumption of industrial wood does not keep pace with changes in gross national product, it does follow a similar pattern of growth. Consumption of individual commodities classified as wood pulp products and wood-based panel products grows faster than gross national product while consumption of sawnwood and unprocessed roundwood both fails to keep pace with gross national product and shows an absolute decline in rate of growth.

As is documented elsewhere in this thesis European pulp producers are intensifying their use of raw materials from the forest, diverting fuel wood to industrial wood uses and using increasing amounts of sawmill residues. This trend may be the explanation for the declining rate of growth of consumption of unprocessed roundwood. Assuming this to be the case it can be expected that consumption of wood pulp products will continue to increase with increasing gross national product and therefore consumption of unprocessed roundwood will also continue to increase.

The increasing demands for stumpage which greater consumption of unprocessed roundwood will cause, constitute an upward pressure on stumpage prices and, through them, on costs of production. In order that production remains economically

attractive to producers, rising prices for the final product can be expected as a result of increased demand for that final product.

Table 3-1 shows the historical behaviour of stumpage prices in Sweden. The table shows quite clearly the position of stumpage prices and logging costs as contributors to the price of logs necessary to attract logging production. Increased demand for sawlogs must cause their price to rise an amount at least equal to the increase in stumpage prices to be expected from more intensive cutting, as well as any increase in logging cost encountered, in order to obtain the increased requirement.

This points up the major downward pressure on stumpage prices. This is the increase in logging and transportation costs. Primarily the cost of logging is tied to the cost of labour which has consistently risen in recent years. The major difficulty is that little technological innovation has taken place to reduce labour costs in logging and furthermore, the work being less pleasant than other classes of industrial labour, wages of loggers, according to Streyffert, tend to be higher and rise faster than the average of industrial wages. Hence, in order that logging continue to meet requirements for consumption, either stumpage prices must fall or roundwood prices must rise. Most often roundwood prices have risen. In fact, by reference to the table it can be seen that stumpage prices, rather than falling, have risen more slowly than logging costs. It would seem then that stumpage prices in Sweden have been set by the differential between logging costs and the price of pulpwood; rather than as a measure of the social or economic value of

TABLE 3-1

PRICE, AVERAGE LOGGING COST, AND CORRESPONDING STUMPAGE FOR 8-INCH SAWLOGS OF PINE IN NORTHERN SWEDEN AND SOUTHERN SWEDEN, AFTER CONVERSION WITH WHOLESALE PRICE INDEX, BASE YEAR 1960.

	NORTHERN SWEDEN Cent /cu.ft. (real volume)*			SOUTHERN SWEDEN Cent /cu.ft. (real volume)*		
Year	Price	Cost	Stumpage	Price	Cost	Stumpage
1909-13	18.6	5.4	13.2	21.2	3.4	17.8
1935-38	27.5	8.0	19.5	24.8	4.3	20.5
1957	41.8	13.4	28.4	45.0	7.4	37.0
1958	37.6	14.2	23.4	34.6	7.6	28.4
1959	41.4	14.4	26.7	42.5	7.8	34.7
1960	44.4	14.4	30.0	48.3	8.0	40.3

The costs include cutting and hauling with horse to river bank in northern Sweden and to truck road in southern Sweden and corresponding overhead. The calculated length of haul is 1.9 miles in northern Sweden and 0.9 miles in southern Sweden through the whole period. The cost of floating is included in the cost of logging in northern Sweden.

*Without bark.

Source: Thorsten Streyffert, Price Trends in Forest Products and Stumpage, Oregon State University, Corvallis, 1963, p. 24.

wood in its best alternative uses.

The pressure of agricultural usage of land on stumpage prices should also be mentioned here. As more and more forest land is taken for agriculture the marginal cost of logging affects the price which must be paid to use forest land for agriculture. Hence although there is a pressure on stumpage prices to rise there is also a pressure, arising out of rising stumpage prices, to reduce the inroads of agriculture into forest land. Furthermore, in many parts of the world, the increase of productivity of agricultural lands by intensive cultivation using more and more mechanization has resulted in a reduction in the extension of the area under cultivation and has, indeed, in some areas resulted in the reforestation of areas previously used for agriculture. Hence the impact of agricultural land use on stumpage prices is small and decreasing. In future, however, it is difficult to foretell whether the extensive margins in agriculture will again come into development or not. A growing world population and widespread starvation seems to indicate that this might be the case, but rising production and more intensive cultivation in the underdeveloped nations, combined with the high price of import grains and the foreign exchange difficulties of the under developed nations, may prevent the development of extensive cultivation in the developed nations.

Notwithstanding all these pressures upon them, stumpage prices often inaccurately reflect current conditions, probably because of a lack of communication of relevant information for the pricing decision. To make this clear, there follows a

discussion of the Alberta system of stumpage prices. It is to be noted how insensitive the pricing system is to the very economic factors which should affect it.

<u>Alberta Stumpage Pricing.</u>[4]

In Alberta, stumpage pricing is carried out in different ways depending upon the usage to which the stumpage is to be put. Primarily Alberta has been a lumber producing area, with very little activity in other areas. Accordingly the stumpage pricing system has become quite complicated and has rested heavily on sawlogs.

Stumpage prices for lumber are arrived at by use of a formula which uses an index of the price of Larch and Douglas Fir lumber f.o.b. at the planing mill in the United States. This index is adjusted to obtain a dollar price and this price is used to enter a table of empirically set stumpage prices. Hence for lumber the stumpage prices are sensitive only to the price of certain species of lumber. It can be seen that the upward pressures on stumpage prices, due to the growing marginal cost of logging virgin forest, is entirely ignored and the downward pressures of labour costs in logging and transportation are reflected in reverse in the price of lumber and tend to adjust stumpage prices upwards. In effect stumpage prices are tied to the market for lumber, not the market for stumpage.

In effect then the price of lumber in the United States is expected to behave in exactly the same way as the valuation the people of Alberta put on their forested areas. When the price of lumber in the U.S. rises, trees in Alberta become more

valuable for erosion control and watershed protection, and more Albertans must want to spend their recreation time in the forest. Furthermore increases in the price of lumber resulting from industry wide cost increases, such as result from increase labor costs, result in an upward shift in stumpage prices which is not industry wide but confined to Alberta.

The use of this lumber stumpage pricing system is justified by its proponents on three major counts. First, since it uses a readily available foreign statistic, much survey work which would otherwise be necessary to develop a mill net price for lumber in Alberta, is avoided. Secondly, the operators in the industry accept the system as it now stands and the department stands ready to alter it, if it becomes necessary to do so in the view of the operators or the Department of Lands and Forests. Finally, the statistic used is developed in the major market for Alberta's lumber and hence is representative for the industry.

But how relevant are these justifications to the determination of stumpage prices? The use of the foreign statistic undoubtedly does provide a mill net price for the majority of Alberta operators at greatly reduced effort. Unfortunately however it is not the mill net price of lumber which is under discussion. Also the mill net price of lumber has very little to do with the value of stumpage, except from the particular viewpoint of the lumber operator. The satisfaction of lumber operators in the province may well be interpreted as meaning that provincial stumpage is currently undervalued and therefore local operators do not want to disturb that situation.

Thus, the above justifications, of course, fail to meet the major objection that stumpage prices should represent conditions in the market for stumpage, or the alternate uses to which timberlands can be put, and ought not to represent conditions in the lumber market entirely, because that market is only a minor factor in the value of stumpage. Stumpage has many alternate uses apart from logging for lumber; it can be logged for pulp, allowed to stand for future logging, allowed to stand for recreational and aesthetic purposes, used for watershed conservation or logged and cleared for agriculture. All these demands on stumpage ought to be considered in pricing stumpage.

For pulpwood stumpage, stumpage prices in Alberta have been intended to be ten percent ad valorem, a valuation thought to provide reasonable returns to the province, but have not been consistent in this. In line with the above arguments, there seems to be no justification of separate stumpage prices depending upon usage. All alternative uses are compared in a price system, and, as with most administered pricing systems, Alberta's stumpage prices fail to make the comparison. Furthermore, basing valuation upon the price of one particular end product is theoretically faulty as argued above.

It is not contested here that different stumpage prices will occur for different species of timber and for different uses. However, the factors which value stumpage on the market arising out of alternative uses other than logging do not produce this differential. The differential occurs according to aesthetic preferences on the one hand and the relative scarcity of pulp or lumber stumpage on the other hand. Hence the

[illegible]

[illegible]

[illegible]

[illegible]

imposition of a differential, other than one based on the relative values for other uses of sawlog sized trees and pulpwood sized trees, seems difficult to justify. The differentials should arise out of the market requirements.

Such a situation seems to occur in the U.S. and the following table shows stumpage prices for a variety of species in 1966.

Stumpage pricing appears to have been predominantly affected by the lumber industry. One method of stumpage appraisal, popular with foresters, takes the value of the final lumber product to be produced, estimates and subtracts all costs of production including logging to obtain the 'conversion return' and states that this conversion return should be "apportion(ed) fairly between stumpage value (which is the timber owner's share) and the margin allowed for profit and risk (the share of the operator who converts the lumber into usable products)."[5] Apparently the owner is perfectly willing to subsidize the operator and receive no compensation for the loss of other benefits of the forest, depending entirely for his income on the good management of the operator.

In Alberta however the owner of forest land, being the provincial government, has a considerable amount of bargaining power and is thus able to dictate the value of stumpage. Thus Alberta operators are not intentionally subsidized by the setting of stumpage values; nevertheless they may actually be subsidized if the valuation put on stumpage is lower than the valuation other uses would put on it. That is, if Alberta's stumpage prices fall below the value of stumpage in alternate uses, then

TABLE 3-2

UNITED STATES STUMPAGE PRICES BY SPECIES AND END USE FOR TIMBER SOLD FROM NATIONAL FORESTS, 1966.

Species	State	Price per thousand boardfeet*
Sawlog Stumpage:		
Black walnut	Illinois	\$ 50.00 - \$100.00
Hickory	Illinois	10.00 - 20.00
Sycamore	Illinois	10.00 - 20.00
Southern pine	Louisiana	25.00 - 38.00
Tupelo gum	Louisiana	18.00 - 24.00
Cherry	West Virginia	13.00 - 50.00
Veneer Stumpage:		
Walnut--	Ohio	
Prime 16-20 inches		200.00 - 1,000.00
Prime 21 inches+		300.00 - 1,600.00
Cooperage Stumpage:		
White oak	Kentucky	30.00 - 90.00
Pulpwood Stumpage:		Price per cord
Southern pine	Louisiana	4.20 - 4.70
Hardwoods	Louisiana	1.50 - 1.85
Spruce and fir	New Hampshire (northern)	4.00 - 6.50

*The prices generally represent timber buyers' quotations without standardized specifications as to grade, log rule, and other factors that affect the value of standing timber.

Source: U.S. Department of Agriculture, Forest Service, The Demand and Price Situation for Forest Products - 1966, Miscellaneous Publication No. 1045, Superintendent of Documents, U.S. Government Printing Office, Washington, 1967, p. 9.

operators in Alberta are receiving an effective subsidy. Similarly when the provincial stumpage prices rise above the true stumpage value then the industry is suffering a penalty. This situation is highly likely to arise when valuation of stumpage is not performed in the market for stumpage, as is the case in Alberta. It should be repeated at this point that stumpage prices attempt to value the sacrifice of releasing wood for logging and thus cannot be set by what is considered a reasonable return or by what will allow the logger a profit. Stumpage prices can be set truly only by valuation of the resource in alternate uses, a process which is not being performed by the owner of Alberta's forest resources.

It seems natural then, in view of the possibility of overvaluation of stumpage inherent in Alberta's stumpage prices that the industry should be dissatisfied. Such is the case for the lumber industry in Alberta.[6]

The pulp industry in Alberta faces a slightly better prospect. Although they are still faced with considerable government regulation of their woodlands operation, their leases run over a longer period and thus they are able to manage their timberlands according to their own needs. As the table which follows will show, pulp operators have not had freedom from variation in stumpage prices. In fact the valuation at ten per cent ad valorem seems to have a more direct link with market value than does the lumber stumpage price system in use in Alberta. In fact as Table 3-3 shows, pulp dues have fluctuated more often and more widely than have lumber dues in Alberta. These fluctuations in pulpwood stumpage prices can be expected

TABLE 3-3

ALBERTA STUMPAGE PRICES BY SPECIES AND END USE, 1951-1965.

TOTAL DUES, YEARLY AVERAGES IN DOLLARS/.000 f.b.m.

Year	Lumber	Poplar & Balsam	Pulpwood
1951	6.19	1.81	n.a.
1952	6.44	1.90	n.a.
1953	6.00	1.75	n.a.
1954	6.00	1.75	n.a.
1955	6.00	1.75	7.65
1956	6.00	1.75	9.55
1957	6.00	1.75	10.39
1958	5.90	1.75	8.26
1959	5.75	1.75	6.94
1960	5.65	1.75	8.26
1961	4.81	1.75	5.23
1962	4.15	1.75	4.67
1963	4.56	1.25	5.57
1964	5.24	1.25	7.78
1965 (½yr. only)	5.05	1.25	n.a.

Note: n.a. data not available

Source: Data provided through the kind cooperation of the Alberta Forest Service.

to reduce as the situation alters from bilateral bargaining to one of monopoly in the supply of stumpage. This effect of stabilization as the number of buyers of stumpage increases from one can be seen by reference to pulpwood stumpage price series for the United States. (See Appendix D).

Before discussing comparative rates of stumpage for various regions in Canada it is important to make clear the difference between stumpage price as defined in this thesis and the value assigned that name in administrative practice. For the purposes of this discussion stumpage price has been defined as the price charged the logger for the right to cut. This value is usually termed 'total dues' in forest administration.

The reason for this is quite simple and logical. Total dues are generally made up of several components the most common three of which are, Crown Dues, Stumpage Dues and overbids.

Crown dues are charges fixed by the legislation under which cutting rights are granted and may be charged by area of land occupied or volume of timber cut or both. Stumpage dues are usually flexible charges over which the local authority, which acts for the government, has control and usually vary according to that authority's particular method of valuing stumpage.

The sum of Crown dues and Stumpage dues is generally known as the upset price. Most cutting rights have been granted by some form of public auction except in cases involving large areas of land as are required by pulp mills. The upset price then is the equivalent of a reserve price at auction, generally intended to ensure that the land is not opened to cutting without payment of stumpage dues and Crown dues.

The overbid then is the excess above the upset price, at which cutting rights have finally been sold. In general, overbids are limited in size by various regulations limiting false bids. If this were not done there is considerable danger that competitors may cause an operator to pay excessive stumpage charges by bidding up excessively the overbid rate.

Direct communication with the forest services in various Canadian provinces has revealed a problem with the data available. It is possible of course to provide data for stumpage costs in each province, but the strict comparability of this data is difficult to ascertain. Many charges are exacted as land rentals and thus without information of production from these areas it is impossible to calculate the rentals in terms of stumpage costs. Some provinces have not collected data either because their present system of charges is too young for any series to develop; or because such a variety of individual agreements exists that no series would give a true picture of stumpage costs in the area.

Data for British Columbia, Saskatchewan, Manitoba, Ontario, Quebec and Nova Scotia have been collected and are presented with brief explanatory comments and discussion in the appendix of this thesis.

Other Wood Costs.

Two further major costs can be included as wood costs. They are logging costs and inward transportation costs.

Logging costs, as was pointed out above are primarily dependent upon labour costs. Discussion of labour costs with

the local pulp industry revealed the opinion that there is a certain interdependence between the stumpage and inwards transportation costs paid and the labour rates which are likely to be offered. This would lead to the conclusion that labour rates will counteract movements in other costs, tending to hold total wood costs stable. This conclusion is unacceptable and the occurence of low labour costs in regions where stumpage and transportation costs are high cannot be taken as significant proof of correlation between these three factors. The pattern, if it exists, is indicative only of careful location selection.

Prospects for logging costs seem to be improving. Until recently there have been few technological innovations in logging or transporting of logs. However the development of clear cutting of stands has provided the opportunity for mechanization of logging. According to industry, machines are now becoming available which can cut trees to pulpwood lengths on the stump. Also mechanized hauling of logs in tree lengths and pulpwood lengths has produced economies in logging.

Inwards transportation costs also seem capable of reduction in future. While these costs presently vary primarily as a result of the difficulties of terrain and the availability of water transportation, future prospects for chipping in the field and transportation by trunk pipelines to the mill show promise for economies in both logging and transportation. This possibility is as yet obscure but further discussion of the possibilities of pipeline transportation for the industry is given elsewhere.

It may appear that undue weight has been given to stumpage

costs and not enough concentration has been placed on the transportation and logging cost components of wood costs. This has been because stumpage costs, being primarily out of the control of the pulp operator can be of great importance to the pulp operation. While the industry appears capable of reducing, over the long run, its costs of logging and transportation, it cannot affect its stumpage costs except by bargaining with the seller.

For wood costs as a group the future prospect seems sound. Future innovations in logging and transportation can be expected to place greater weight on stumpage costs as stumpage prices rise with increasing public awareness of the value of forests. However the overall growth of wood costs seems likely to be less than the growth of stumpage prices due to economies expected in other areas.

However in order that these prospects be realized it seems necessary that the valuation of stumpage by provincial forest owners be reappraised and put on a sounder basis. If this is not done there seems to be real danger of stumpage prices outstripping society's valuation of forests. If stumpage prices remain tied to the price of the final product then stumpage price increases not absorbed by reductions in logging, transportation or manufacturing costs will result in higher final product prices again affecting stumpage prices.

Wood costs have important effects on the inter-relationships of the lumber and pulp industries. Prior to discussion of manufacturing and distribution costs, there follows a discussion on two of these effects.

It is important to note at this juncture an important difference between the abilities of wood using industries to absorb increased wood costs arising out of increases in stumpage prices. Little technological innovation has been available to the lumber industry in either logging, transportation or manufacture, which has not been also available to the pulp industry. Also the pulp industry has had the advantage of several innovations and of large scale in manufacture. This has resulted in heavy capital investment in pulp and paper manufacture and has put the lumber industry at a disadvantage when competing with the pulp industry for raw materials.

Discussing this point Thorsten Streyffert states:

> "As for the important bearing of technical developments on the cost of production, this varies for different commodities and for different raw materials. This circumstance is, in fact, the most important cause of the different price developments for lumber on the one side and for pulp and paper on the other side, as demonstrated in the British market. While the pulp and paper industry has lent itself admirably to far-reaching mechanization and technical and chemical innovations in plants of ever-increasing capacity, the sawmill industry has not had the same possibilities for rationalization. Indeed, after the exploitation of virgin forests it has taken the opposite way towards small and middle-sized mills. Moreover, as the supply of suitable raw materials has been sufficient to meet the rapidly increasing demand for paper and other pulp products, the cost of the raw material at the mills has not prevented the declining trend of prices for these products. On the other hand, the sawmill industry has had to pay for its raw material at a minimum price set by another industry, viz., pulp and paper, while a price ceiling has been imposed upon lumber through the use of substitutes. This explains why in countries where the sawmill industry has had to compete with the woodpulp industry for raw material the financial return on investment in the former industry has been rather low and its possibilities to pay high sawlog prices have been limited. Exception from this general rule will, of course, occur where it is difficult to supply a local

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> demand for lumber or where pulpwood prices are still low."3

The pulp and paper industry in recent years has been moving towards more intensive utilization of its forest resources. The reason for this has primarily been rising costs of extraction of forest products.[7] That this should be so runs contrary to expectations of other authorities in the field of government regulation of forest resources. Specifically Milton Moore,[8] in criticizing government stumpage charges by volume removed, points out that the effect of this should be to limit the operator to logging only that timber which by virtue of its accessibility and immediate value is worth both the stumpage and the logging costs. In this case full utilization of the forest would not be obtained and considerable waste would result.

What apparently has occurred on woodlands owned by larger operators has resulted from the economies available from large scale mechanized logging. Rather than selectively cutting areas for the prime raw material required, large operators appear to favour clear logging and disposal of the logged timber according to its best use. Hence logs suitable for sawlog and peeler log use are directed by sale or transfer to operations requiring them despite the fact that they were logged by a pulpwood operator.

Manufacture.

No serious investigation has been made of manufacturing costs for the pulp and paper industry because it is not considered that costs of manufacture will be a determining factor in the locational choice decision of the industry. The processes

by which pulp can be made are well known throughout the industry. Essentially they require the availability of wood, water, labor and chemicals. Wood costs have already been discussed.

Water should be available in large quantities not only for the manufacturing process but also to dilute the plant effluent sufficiently so that there will be no serious downstream pollution. Lack of water can cause large capital expenditures to become necessary so that effluent can be satisfactorily treated. The Alberta Forest Service has made a study of rivers in Alberta and has found several locations suitable for a pulpmill and capable of handling their effluent.[9]

Labour costs of course, vary across Canada but not by amounts large enough to deter industry. What will of course deter the development of industry is a lack of labor. If labor is not locally available a new industry may have to bid up wages to such an extent that local development becomes uneconomic. Direct contact with Canada Manpower centers in Alberta has revealed no fears that a lack of manpower would exist sufficient to deny labour to a newly established pulp mill.

Also some slight differences are likely to affect cost of chemicals in Alberta. However considering the developing local chemical industry and the proportion of total costs likely to be made up by chemicals it seems difficult to imagine this being a deterrent to industrial development. Chemicals from distant parts would suffer extra transportation costs but the variation would be small in its effect on production costs. Freight rates discussed later show small disadvantages for an Alberta based operation considering the quantities involved.

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Hence, since no major factor affecting manufacturing costs appears to be dominant in Alberta, the assumption has been made that manufacturing costs in an efficient Alberta pulp mill will be comparable with the costs encountered elsewhere.

Since no study has been made of costs of manufacturing pulp, no conclusions can be reached about future movements in these costs. It might be expected, on the basis of the capital intensive nature of the process, that cost increases will not keep pace with the increase in labour rates to be expected in the long run.

Distribution Costs.

Costs of distribution are particularly important to potential pulp and paper producers considering location in Alberta. The vast distances over which products must be shipped to reach eastern and overseas markets and the natural barrier of the Rocky Mountains immediately give the impression of immense transportation costs to be overcome.

This section shows that not only are the present costs of transportation lower than might at first be expected in comparison to operations based in other provinces but also future advances are likely to reduce them further. There is a distinct possibility that in the long term transportation cost differences might become quite low.

The following table gives rail freight rates quoted for the origins and destinations stated. Considering the New York destination for points of origin at Hinton, Alberta and Marathon, Ontario, this table shows that the cheapest possible freight

TABLE 3-4

CURRENT RAIL FREIGHT RATES PUBLISHED FOR SHIPMENTS OF WOODPULP IN CAR LOADINGS OF 100,000 lbs. AND 120,000 lbs. AS STATED FROM HINTON, ALBERTA; PRINCE GEORGE, KAMLOOPS AND KRAFT, BRITISH COLUMBIA; AND MARATHON, ONTARIO; TO NEW YORK, MONTREAL, CHICAGO AND VANCOUVER, IN DOLLARS PER 100 lbs. DELIVERED.

Port of Origin	Destination							
	New York		Montreal		Chicago		Vancouver	
	(#shown in '000s) ($ per 100 lbs)							
	100#	120#	100#	120#	80#	120#	100#	120#
Hinton, Alta.	$1.10	$1.00	1.24	1.14	0.93	0.83	-	-
Kamloops, B.C.	1.14	1.04	1.28	1.18	0.96	0.86	0.28	n.a.
Kraft, B.C.	1.10	1.00	1.24	1.14	0.93	0.83	0.31	n.a.
Pr. George B.C.	1.14	1.04	1.28	1.18	0.96	0.86	0.44	0.42
Marathon, Ontario	n.a.	0.99	n.a.	0.95	n.a.	0.70	-	-

Note: Rates to United States destinations are subject to a $0.01 increase in the near future.

Source: Alberta Freight Bureau, through the kind cooperation of Mr. J. Telford.

rate out of Hinton is $0.01 higher per 100 pounds than the rate out of Marathon. This amounts to $0.20 extra cost per short ton delivered in New York and a total freight cost of $20.00 per short ton. Of course this is the lowest cost difference shown in the table the largest being $0.29 per 100 pounds for shipments to Montreal. Nevertheless the table shows that transportation cost differences between western Alberta and Ontario origins amount to no more than $5.80 per short ton in a total cost of $24.80 which is the rate shown into Montreal.

Reductions in rail freight rates appear to be possible by increasing of car loadings. This can be done by use of specially designed cars.

In connection with transportation costs it is valuable to consider the development of pipelining technology.

Possibility of Pipelining Pulp.

Pipelining of fluids over long distance has been established since the building of a 24 inch line more than 1,000 miles long in 1931 to carry natural gas from the Texas Panhandle to Chicago.[10] However the carrying of solids by pipelines has a much shorter history.[11]

The technology is now being developed which will allow pipelining of dry cargoes in capsules and pipelining of all types of solid cargoes as slurrys, pastes and ingots.[12] In fact the emergence of pipelines as "common carriers" is foreseen.[13]

In the light of these developments and the vast distances Prairie producers have to transport their products, it seems valuable to consider the possibilities and costs to be

expected both for transporting chips to the mill and pulp to the market for Prairie pulp manufacture.

That the pulp and paper industry is interested is obvious from their efforts to develop pipelines for chips.[14] Experiments have been done and knowledge is available on the behaviour of woodpulp in pipelines as a water slurry.[15]

Continuing work is being carried out on the problems associated with scaling up pipeline operations to sizes of commercial feasibility.[16] Hence, it would appear that long distance pipelining of woodpulp is feasible.

In discussing the pipelining of sulphur, H.W. Habgood has presented cost data which appears at present to be at least competitive with rail freight rates presently available.[17] This paper quotes long distance large diameter oil pipelines as charging 0.2 cents per ton mile and arrives at figures of between 0.5 and 0.8 cents per ton mile for transportation of one million tons annually of sulphur. These sulphur costs are pointed out to be lower than probable actual costs by the various extra charges associated with various unusual forms of pipeline transport necessary to transport sulphur. The higher limit of these base costs the paper attributes to costs of pipelining sulphur as a slurry, which is the apparent most probable form of wood pulp transport in pipelines. The article also provides a most informative figure giving capital costs for oil and gas pipelines and for compressor stations in the United States for the years 1962 to 1963.

Unfortunately although pipelining of wood pulp is feasible and technologically possible it is not practically or economically

possible. Pipelines involve a large quantity of inventory. Taking the interprovincial pipeline as an example, its capacity when full is 400 million gallons. At 10 pounds per gallon for pulp, (an unrealistically low figure) this means a capacity of 2,000,000 tons of very dilute pulp. The present pulp mill in Alberta produces 500 tons of air dry pulp per day, at which rate it would take over six years for that mill to fill the interprovincial pipeline with air dry pulp. In other words, even diluted pulp will not provide sufficient production to make the use of pipeline transportation feasible.

Furthermore a pipeline gives very limited flexibility in markets to be served and requires almost complete certainty that the market to which the pipeline is laid will always take the full production of the pipeline. It is not suited to custom shipments to various customers in various locations.

Additional to these points is the large capital cost involved, which are of the order of 3 to 4 thousand dollars per inch mile.

Thus it does not seem that pipelining will be a practical alternative to present modes of transportation for woodpulp in the foreseeable future. Although short distance pipelining may become possible, long distance pipelining does not seem to have prospects of becoming economically or practically possible.

Considering present transportation rates and the possibilities of reductions in the future, transportation does not appear to present the insurmountable barrier it might were freight rates on a ton mile basis. Pipelining under similar

freight agreements might result in similar (1 percent to 25 percent of total freight charges) disadvantages to Alberta producers, but the reduction in total freight charges would make this a small part of total costs.

It would appear that freight rates are structured in such a way that a reasonable amount of product differentiation can absorb the increased costs. The present pulp producer in Alberta does this with apparent success and it seems likely that other Alberta producers would be able to do the same.

<u>Summary.</u>

Wood costs appear to be the most important factor determining the ability of further pulp operations to develop in Alberta. Among wood costs the most difficult factor to appraise and the one over which the operator has least control is stumpage prices. The charges which an operator must pay in order to be able to cut in Alberta's forests can be expected to increase if the present system of setting them remains in effect. Furthermore there seems a possibility that they may increase faster than the actual value of stumpage increases thus putting the province at a disadvantage to areas more realistically valuing their stumpage.

Logging costs appear to have prospects of reduction in the future although such reduction is likely to be industry wide and not confined to Alberta alone. Similarly both inwards and outwards transportation may be expected to decline in cost and the decline in outward transportation costs may well improve the position of Alberta vis a vis producers closer to major

markets. No rapid change is expected in manufacturing costs, but no detailed study has been made of these costs due to their apparent similarity between regions.

REFERENCES

1. Duerr, W.A., Forestry Economics, McGraw-Hill, New York, 1960, p. 328

2. F.A.O., European Timber Trends and Prospects, A New Appraisal, 1950-1975, New York, 1964, p. 209.

3. Ibid., p. 29.

4. Information obtained from the Department of Lands and Forests, Province of Alberta.

5. Forbes, Reginald D., Forestry Handbook, New York, The Ronald Press, 1961.

6. Information from Alberta Forest Products Association.

7. This information kindly supplied by Mr. P.C. Read of Crown Zellerbach Canada Ltd. in a seminar given to students of commerce from the University of Alberta, Edmonton, at Banff, Alberta in March 1967. Subsequent verification of the point was obtained by direct communication with the following and Mr. Read himself:
International Paper Company, New York, N.Y.;
Canadian International Paper Company, Montreal, Quebec;
Consolidated Paper Corporation Limited, Montreal, Que.;
Domtar Newsprint Limited, Montreal, Quebec;
Olinkraft, West Monroe, Louisiana;
Crown Zellerbach Corporation, San Francisco;
British Columbia Forest Products Ltd., Vancouver, B.C.;
The Price Company Limited, Quebec, P.Q.:
Kimberley Clark Corporation, Neenah, Wisconsin;
Union Camp Corporation, Savannah, Ga.
Abitibi Power & Paper Company, Limited, Toronto, Ont.;
MacMillan Bloedel Limited, Vancouver, B.C.;
Weyerhaeuser Company, Tacoma, Washington;
Potlatch Forests, Inc., Lewiston, Idaho;
St. Regis Paper Company, New York, N.Y.

8. A. Milton Moore, Forestry Tenures and Taxes in Canada, Canadian Tax Foundation, Tax Paper No. 11, Toronto, 1957.

9. Data developed by Mr. R. D. Loomis, Administrator, Forest Management, Alberta Forest Service.

10. Jensen, E.J. and H.S. Ellis, "Pipelines", Scientific American, January, 1967, pp. 62-72.

11. Ibid.

12. Hodgson, G.W. and E.J. Jensen, "Pipelining of Potash - An

Examination of the Possibilities", Research Council of Alberta, Edmonton, 1966.

13. Jensen, op cit., p. 72.

14. Jensen, op cit., p. 70.

15. Hodgson, op cit., p. 4.

16. Hodgson, op cit., p. 6.

17. Habgood, H.W., "Transportation of Su;phur by Pipeline", Contribution No. 225 from the Research Council of Alberta. Presented to the Sixth Western Regional Conference of the Chemical Institute of Canada, Trail, B.C., Sept. 12, 1963, and available in Oil-week, October 14th, 1963.

CHAPTER IV

THE CONCEPT OF SUSTAINED YIELD AND ITS RAMIFICATIONS

The importance of the particular principles of forest management in use to regional development could easily be overlooked. But when it is realized that forest management can radically change the nature of a forest resource and its suitability for particular uses, its importance becomes apparent. In most regions of North America today the basic principle of forest management promoted is 'sustained yield'. This principle is usually required as the basis of a prospective operator's forest management plans, in spite of controversy about its ultimate value and misunderstandings as to its meaning.

Regional differences in application of the principle can, of course, seriously affect the nature of the production of various regional forests. Natural pulpwood forests can be made to produce sawlogs when production of pulpwood might be more suitable both physically and economically.

Furthermore the choice of emphasis in 'sustained yield' can affect the returns to a region from development of forest industries.

The reason that this discussion of 'sustained yield' is included in this thesis springs from the fact that it is specified as the mode of forest management to be used on almost all timber holdings in North America. It is therefore important to industry to know the extent to which the local authority might limit industry's attempts to obtain maximum economic benefit from its forest lands.

This chapter argues for a new look at 'sustained yield' so as to develop the concept to a stage where it becomes an economic tool capable of increasing both the returns to forest owners and the attractiveness of forest resources to the wood using industry. The problem is difficult and often misunderstood. A solution is not developed here; the problem is presented and its importance shown.

Although the regional effects of forest management methods are not immediately obvious, it appears that even in the situation that one concept is accepted throughout the country as the desired mode of forest management, regional differences can arise from misunderstanding of the concept.

It is shown that Alberta is not obtaining the returns which are available from her forest resources due to inadequate utilization of those resources. The problem of managing forests for economic returns is discussed.

In the past there has been argument as to whether the forest is a crop or a mine. William A. Duerr[1] emphasizes that it is a crop, but points out that the controversy has had some basis in the irreplaceability of virgin forest and the possibility of reducing timber inventories faster than regeneration can build them up.

The problem of greater and greater utilization of forest products producing heavier and heavier drains upon virgin and second-growth forests has been treated by several authors. Thoresten Streyffert[2] sees the solution in developing regenerative management of accessible forest resources and expanding virgin forest cutting to cope with expanded needs.

However, the problem is not quite so simple. Different forest resources have different uses while the same forest resource can also be put to several uses. For instance long-fibred coniferous softwoods are particularly suited to the manufacture of newsprint, as has been discussed earlier in this thesis. However coniferous woods are also in much demand as lumber, and the raw material for lumber (sawlogs) needs to be much larger than does the raw material (pulpwood) for newsprint manufacture. Likewise, sawlogs can be used for pulpwood and sawlog-sized timber occurs quite often in pulpwood stands.

If consideration is made only of lumber and woodpulp requirements, the first problem simplifies. It is necessary to provide from second growth sufficient timber to satisfy the volume and size requirements of the lumber and pulp industries. Even simply stated in this form, the problem remains difficult due to the fluctuating requirements of each industry and the resulting fluctuations in the value of sawlog or pulpwood timber.

In the face of fluctuating values and various sizes of growing stocks, which fluctuations occur during the long period required to bring a tree to maturity for either of these uses, the problem of rationalization in the production of timber becomes most complex.

The forest management concept known as sustained yield has become a popular solution to the problem of degradation of the world's forest resource base. However, the development of the concept has tended to neglect the inherent fluctuations in the value of timber resources and its use in overcoming this problem has been avoided.

What then, is meant by the term 'sustained yield'? Technically the definition of sustained yield approved by the Society of American Foresters is as follows:

Sustained yield--

> "As applied to a policy, method, or plan of forest management, implies continuous production with the aim of achieving at the earliest practical time an approximate balance between net growth and harvest either by annual or somewhat longer periods."
>
> "As applied to forest management, implies measures which will maintain the productive capacity of the land."
>
> "As applied to a forest, refers to one which is on sustained yield management."
>
> "As applied to a forest region, implies an approximate balance for the region as a whole between growth and drain."
>
> "Sustained-yield forestry is the management of a specific forest or a definite district thereof in such a way that the annual or periodic cut of forest products is equal to or in balance with the current net growth of the lands so that annually or periodically the lands will yield approximately a given volume of forest products."[3]

What becomes obvious from this definition of sustained yield is that the definition of sustained yield lies in the answer to the question: yield of what? The forester considers that this should be answered by: a constant yield of forest products in units of quantity such as volume or weight. However, even from the foresters point of view, this does not seem to

be a satisfactory solution. The problem seems to be only partly solved by this approach.

If our problem is the degradation of the resource base of the forestry industry, then surely its solution does not lie in the production of forest products of a given quantity periodically. At least part of the solution must lie in the satisfaction of current demands and the minimum possible depletion of the forest resource. In other words, if the problem is essentially depletion of a scarce resource, then its solution must, at least in part, lie in economizing in the use of that resource.

The process of economizing is defined by Dahl and Lindblom as follows:

> "Economizing is rational action in economic life, more particularly in the employment of certain kinds of resources. Alternatively, economizing is the process of arriving at the most efficient employment of these resources to satisfy human desires."[4]

The obvious problem arising out of this is the measurement of the amount of resources required to 'satisfy human desires'. Many problems arise here. However, to avoid them, they are ignored here by saying that the level of desirability and the quantity desired of forest products are adequately defined by the price system in our free market economy and the particular schedule of quantities desired at various prices, which is known as the demand curve, which is pertinent at that point in time. In this way it can be said that the current price, in combination with the suppliers knowledge of the quantity he is prepared to supply and is required to supply at that price, provides an adequate definition of the volume of forest products required from the forest. It appears

obvious that, in view of price fluctuations resulting from changing desires of consumers and changing willingness to supply of producers, a constant volume of forest products cannot always be compatible with economizing or a policy of minimum possible depletion of resources.

There is an old truism which goes to the effect that a stopped watch is more accurate than an operating watch, because the stopped watch is exactly right at least twice every day, whereas the running watch may never be exactly correct and furthermore, the more accurately it runs, the less often it is likely to be exactly right. In spite of this most people persist in winding their watches so as to have an approximate indication of the correct time more often than twice a day. Similarly, although a policy of sustained yield based on volume may be correct in providing a supply just sufficient to satisfy requirements occasionally, it cannot be superior to a policy which attempts to produce a sufficient volume to satisfy requirements at all times, even though it may still only approximate the correct quantity.

If the object is to preserve for most efficient employment scarce forest resources, then the quantity produced should bear some relation to the measure of requirements for those resources. The price system attempts to evaluate in dollars the relative urgency of need for various forest products, bearing in mind their relative availability at the present time. Assuming for the moment that the relative prices of forest products do actually reflect the relative needs for those products, then the most efficient distribution of forest products,

according to the dictates of the market, should yield the greatest possible return to the forest producer, both now and in the future. Relaxing the assumption that the price system accurately reflects requirements to an assumption that it approximates a measure of those requirements, does not affect the superiority of using the price system as a determinant of requirements over use of an arbitrarily fixed quantity figure in determining most efficient employment. An approximate solution remains better than one which does not attempt solution at all.

Hence the best approach to most efficient usage of the scarce forest resource would appear to be one that attempts to maximize the long run returns from the forest resource. Following from this then the yield to be sustained is the yield of maximum return from the market for employment of forest resources. That this is possible has been recognized by many exponents of sustained yield management; indeed many have used improved financial returns as the justification for utiliaztion of the management concept.

One of the most outstanding examples of this is the sustained-yield Forest Management Act of March 29, 1944 in the U.S. It authorized the Secretary of Agriculture and/or the Secretary of the Interior to establish cooperative sustained yield units consisting of Federal forest land and private forest land or Federal sustained-yield units consisting only of Federal forest land, when in their judgement the maintenance of stable communities is primarily dependent upon Federal stumpage and when such maintenance cannot be secured through usual timber-

sale procedures. Several of these units have since been set up.[5]

Also Colin Marshall[6] recognizes the economic benefits arising from improved silviculture resulting from sustained-yield management when discussing management methods for mangrove salt water swamp forest in Fiji.

The controversy between the economist and the forest administrator is of long standing as Goundrey points out.[7] Goundrey proposes management of the forest to maximize the rate of growth of capital as the expected behaviour of the owner of the forest and, instead of arriving at prescriptions for management, proposes stumpage charges which must be made if maximum sustained yield is to be practiced by the operator. The important point is that the forest operator will attempt to increase returns to this capital by utilization of the forest resource made available to him and therefore will not practice sustained yield of quantity if he can maximize the value of his yield. It is interesting to point out also that the development of maximum sustained yield through Crown manipulation of stumpage charges not only violates the stumpage pricing factors enunciated previously in this thesis but, as Goundrey points out, results in a loss of revenue to the Crown.

The attitude of the forester towards sustained yield with the object of maximizing value or returns (or profits) is well summed up by Loucks[8]. He develops two linear programming models the first aimed at maximizing the volume cut subject to certain constraints and the second is required to minimize the area to be cut while producing a specific yield for each cutting period.

"One could just as readily maximize value instead

> of volume. However, in addition to future growth and volumes, future logging costs, stumpage prices, and interest rates would have to be estimated. This only compounds the possibility of inaccuracy in the solution in spite of the more sophisticated model that might be constructed."[8]

The fact that sustained yield of maximum value is a very difficult concept to apply practically is not questioned here. The basic argument is that current methods of sustained-yield management fail because they do not attempt to sustain the value of forest production over time.

So as not to minimize the difficulty of managing for sustained yield of maximum value it should be recognized that lumber and pulp are not the only requirements which forest industries must meet through logging of forests. According to the Dominion Bureau of Statistics, timber is logged for logs and bolts, logs for pulping, pulpwood, fuelwood, poles and piling, round mining timber, fence posts, hewn ties, fence rails, wood for charcoal, miscellaneous roundwood, and other products.[9]

Each of these uses has its own value and each product its individual price. Most of these products' prices vary independently of one another to a greater or lesser extent. Furthermore, some of these, such as round mining timber and hewn ties, are in decline in value of production. Others such as poles and piling fluctuate quite widely and yet others, such as fuelwood, pulpwood and logs and bolts maintain steady or increasing values of production.

Hence, as an initial step, the sustained yield of maximum return manager must estimate future prices and levels of requirements for all these direct forest products. He must then

select which of these products he considers will yield most return and aim at producing the size and type of tree most suitable. The extreme difficulty is obvious when it is considered that the regenerative cycle may be from 30 years to over 100 years and that progressive forecasts must be carried on through this period.

However, some simplification of the problem of complexity seems possible due to certain restraints likely to be imposed upon the operator by markets and by location.

Climatic conditions in an area to some extent limit the number of species which can be grown there and therefore restrict to some extent the end uses available. Some species are particularly suited to some end uses over others and, in fact, command premium prices in that end use.[10] However, it does not appear that this selectivity of species is particularly powerful in selecting the end use of timber since many species are practical for a great variety of end uses. But climatic conditions can also affect growth rate and the ultimate size of any particular species, thus affecting quite substantially the returns available. It would appear then that there is a problem of comparative advantage in producing forest products. For instance, an area where climatic conditions have prevented growth of species of suitable size for use as sawlogs or peeler logs, but has resulted from natural growth in a large quantity of pulpwood sized timber, would be well advised to maintain the production of pulpwood. True, silvicultural practices could produce sawlog and peeler-log sized trees, but the same silvicultural practices

could well reduce the period required to produce pulpwood. Furthermore, the area would have a large reserve of standing pulpwood forest which could immediately be brought into production, without having to wait until the practice of silviculture results in sawlogs which have grown naturally, and thus at less expense, elsewhere.

Another factor affecting the choice of forest product is the amount of investment already made. If, for example, a large investment has already been made in pulpmill facilities and woodlands producing pulpwood sized timber, it would seem difficult to justify the development of a lumber mill unless woodlands, sufficiently stocked to provide the larger sized timber required by the lumbermill, are available to it.

Sustained yield management, designed to produce raw material of suitable quality and quantity for a pulpmill, after one rotation should, in the ideal case, reach a point where no sawlog sized timber will remain. It would therefore seem pointless to invest in a sawmill in this situation when the sawlogs required will only be available over a relatively short period. Practically, however, sawlog sized trees do develop from seeder trees left after the first rotation, and from areas with site advantages for growth rate.

In the case of large scale forest owners however, the problem remains unabated. The owner needs to forecast prices and requirements of all possible primary forest products and manage his timber accordingly. As discussed above, the problem is a difficult one, but this does not preclude the attempt to solve it.

This is the problem facing the Canadian Government forestry agencies both at the Federal and Provincial levels. Federal and Provincial ownership has been estimated to be 90 percent of the Canadian forest area.[11] The responsibility of these agencies is to manage these forest areas in the best interests of the owners, the Canadian people. The difficulty of this responsibility is patently obvious.

In this case the problem is seldom simplified by the presence of installed capacity. It is more often probably complicated by the political power of particular regions and groups, whose requirements do not necessarily coincide with the economically most desirable alternative. An example of this may well be the lumber industry in Alberta, but this will be discussed later in this chapter.

Depending on the scale of operation of the agency, the opportunity does exist to establish comparative advantages for particular forest regions over others for particular forest products and, hence, to carefully study the capabilities of each region in purely physical terms. Also these agencies have the potential of becoming the foremost centres of research on future trends in the forest industries and their markets. To a large extent the U.S. Department of Agriculture, Forest Service, has already become a responsible forecasting service for forest products industries, and these studies might well become the backbone of an effort to develop sustained yield of maximum returns management in the forest areas under their control. Examples of publications of the U.S. Department of Agriculture

are "Timber Trends in the United States"[12] and "The Demand and Price Situation for Forest Products 1966"[13].

In Canada much of the work required for an effort of this type has not been done, and indeed it would appear that it will not be done for some time. The Federal Department of Forestry is inadequate to the task to date, mainly due to its youth, having been established as an integrated forest research group only in 1960, and also due to its lack of manpower. Specifically, the field of forestry economics is receiving inadequate attention.[14]

In Alberta it would appear that the Forestry Branch of the Department of Lands and Forests is also a small budget operation and, although actively inventorying Alberta's forests and developing management units, few of the management plans developed appear to consider any alternative other than lumber production. Management units are run on a lumber economy, planning cutting cycles long enough to produce trees of sawlog size. Also, according to the Alberta Forest Service, the Department considers its planning to be restricted to species naturally occurring in Alberta and so justifies a lack of study of other possibly suitable species. However, test planting is presently being started in Alberta.

Private forest owners appear to have a more active interest in the development and utilization of their forest resources.

In order to obtain information on this point at first hand, letters were sent to several major pulp and paper companies, the majority operating lumbermills as well. They were specifically asked to comment on the integration of lumber and pulp operations on the same woodland. There was no intention of

quantitative research; the object was to ascertain if current industry was attempting to get maximum economic usage of its forest resources. Twelve of the fifteen answers obtained were very informative and confirmed the point that forest industry is attempting to gain maximum usage of its forest resource. However, the method used to do this falls into two classes.

Large lumber operations operating on forest resources primarily suited to sawlog production sell their waste products such as sawdust and chips and their residual raw material such as tops and small logs to pulp mills operated by others or by themselves.

Large pulp and paper operations operating on forest resources primarily suited to pulpwood production sell higher value logs to sawmills or plywood and other products manufacturers, usually in return for sawmill waste which the pulp operators purchase.

Where the major operator operates on mixed forest containing considerable amounts of both sawlog and pulpwood-sized timber, the subsidiary operations tend to be independent operators and the relationship between companies is by agreement.

What is most obvious is that the major pulp operators have attempted to utilize their forest resources to the utmost, and this appears to have occurred as costs rose due to the degradation of the most easily accessible forest resources.[15] We can say, therefore, that the exploitation of forests under logging has become more intensive, but whether the application of more sophisticated management techniques such as sustained

yield of maximum value has intensified is not shown.

However, some better idea of the extent to which Alberta's forest areas are being managed for sustained yield of maximum value can be obtained from carefully studying the production and value figures produced by the Dominion Bureau of Statistics. Shown in the table below are unit prices, production and value distribution for forest products production in Canada and in Alberta. Tables for the rest of the Canadian provinces and the territories are shown in Appendix 2.

As shown in this table, 60 percent of Alberta's production of forest products yields 52 percent of the value of Alberta's forest production, while 32 percent of production yields 48 percent of the value. Obviously then, Alberta's forest production is not concentrated on producing the highest possible return, even at the logging stage. It should be noted that Alberta's forest products suffer a price disadvantage to the Canadian average; hence Alberta producers should concentrate on the high value end uses for their products. In order to enumerate these, the following table has been broken down for all products. (See Table 4.2) It is immediately obvious that Alberta may be in a better position to produce the low volume high value forest products, while avoiding the low value products as much as possible. In light of the low unit price of logs and bolts it would appear that no further development of this market ought to be done and the market for pulpwood, which is capable of much expansion and for which Alberta contains large quantities of raw materials, provides more opportunities for the development of high value production than does lumber production.

TABLE 4-1

DERIVED UNIT PRICES, PROPORTION OF TOTAL QUANTITY OF FOREST PRODUCTS PRODUCED, AND PROPORTION OF TOTAL VALUE OF FOREST PRODUCTS PRODUCED, IN CANADA AND ALBERTA, 1961, BY FOREST PRODUCT.

CANADA 1961

Item	Unit Prices $/cu. ft.	% of Production[2]	% of Value of Production[2]
Logs and bolts	0.23	51.0	47.7
Pulpwood	0.28	39.8	43.6
Fuelwood	0.15	7.2	4.2
Poles and piling	0.69	0.7	2.0
All other products[1]	0.49	1.1	2.2
Weighted average of all	0.25	100.0	100.0

ALBERTA 1961

Item	Unit prices $/cu. ft.	% of Production[2]	% of Value of Production[2]
Logs and bolts	0.14	61.3	47.9
Pulpwood	0.21	21.5	24.3
Fuelwood	0.11	6.7	4.1
Poles and piling	0.30	0.1	0.1
All other products[1]	0.43	10.2	23.3
Weighted average of all	0.18	100.0	100.0

[1]This classification includes round mining timber, fence posts, hewn ties, fence rails, wood for charcoal, miscellaneous roundwood, and other products.

[2]Columns may not add to 100.0 due to rounding by author.

Source: Canada, Dominion Bureau of Statistics, Industry

Division, Logging, 1961, Annual, Catalogue No. 25-201, Queen's printer and Controller of Stationary, Ottawa, 1963. Table 1.

Although it is not the purpose of this thesis to produce models of sustained yield of maximum value, it should be possible to use these tables over a series of years to develop linear programming models for optimum value of production and hence optimum returns to the province from use of forest resources.

The Province of Alberta operates its forest resources on a sawlog economy. As has been shown above, sawlogs present very low value to Alberta even as compared to the Canadian average value, and, therefore, the Province is not obtaining maximum return from its forest resources. However, although forest products are low valued in Alberta, concentration on the high valued forest products combined with efficient and complete utilization of raw materials could yield more returns to the province with the same depletion of growing stock.

Alberta's forest management has for many years been based upon a public auction method of disposing of timber rights. The Provincial Government applied an upset price to stumpage cut and the bid price was applied over and above this.[16] However, the members of the industry became dissatisfied with this system of pricing and expressed their dissatisfaction to the Alberta Forest Service.[17] Also the Alberta Forest Service at this time was experiencing difficulty enforcing regulation of cut from Crown lands. The situation and the resulting change were explained as follows in 1965:-

[illegible]

[illegible]

[illegible]

TABLE 4-2

DERIVED UNIT PRICES PROPORTION OF TOTAL QUANTITY OF FOREST PRODUCTS PRODUCED, AND PROPORTION OF TOTAL VALUE OF FOREST PRODUCTS PRODUCED, IN ALBERTA IN 1961, BY FOREST PRODUCT.

Item	Unit Price $/ cu.ft.	% of Production*	% of Value of Production*
Logs and bolts	0.14	61.3	47.9
Pulpwood	0.21	21.5	24.3
Fuelwood	0.11	6.7	4.1
Poles and piling	0.30	0.1	0.1
Round mining timber	0.17	0.02	0.02
Fence posts	0.20	1.2	1.3
Hewn ties	-	0	0
Fence rails	0.37	0.1	0.2
Miscellaneous roundwood	0.45	8.8	21.0
Other products	-	0	0.6
Average unit price	0.18	100.0	100.0

*Columns may not add to 100.0 due to rounding by author.

Source: Canada, Dominion Bureau of Statistics, Industry Division, Logging 1961, Annual, Catalogue No. 25-201, Queen's Printer and Controller of Stationary, Ottawa, 1963, Table I.

> "Since the inception of timber sales in Alberta timber has been disposed of by sale at public auction or by sealed tender to the highest bidder. These methods have succeeded in providing adequate crown dues but they are not entirely compatible with sustained yield, maximum utilization and other good forest management practices.
>
> "The sales method of timber disposal has been reviewed by the government and the lumbering industry, and enabling legislation was passed late in the year under review to establish a new method of timber disposal known as the quota system. This system is designed to provide better sustained yield forest management for the Province."[18]

Whereas under the old sales disposal system operators were required to rebid upon expiry of licences, under the new 'quota system' operators obtain rights to cut an area of forest land which is cruised and assessed by the Alberta Forest Service. The contract specifies minimum and maximum annual cuts and a specified maximum quantity which may be cut during the three year tenure of the quota. The lumbering industry is again dissatisfied with the system, as it claims the assessments which began appearing in 1967 are too high.[19]

It should be noted that the new system applies only to the management of sawlog forests. The pulp industry appears free to manage as it pleases and the Province does not concern itself greatly with the management of pulpwood lands. The Province prepares management plans for units which are considered to have potential to support a sawlog economy.[20]

Summary

The concept of sustained yield of maximum returns, although cumbersome, is capable of incremental application and is capable of ensuring more efficient utilization of forest resources. It is clear that the concept, although widely

recognized, is not widely applied and the benefits available from it of maximum returns from resources and assurance of a regenerated resource are therefore lost. In Alberta sustained yield of volume of sawlogs appears to be the only principle of management applied. Whether the Province should be producing sawlogs at all appears questionable, especially considering their low value, but this question is not considered by the management methods used.

Although pulp manufacturers in Alberta are relatively unencumbered by government forest management regulations, they can expect to have some restraints written into their lease. However, these requirements appear largely to be applicable to reseeding practices and perhaps maximum annual cut requirements.

No excuse is offered here for the lack of emphasis in this chapter on the position of the operator. Where resources are not being disposed of to their best use, it seems obvious that the firm is not maximizing its earning capacity. Also the management of Alberta's forest in a manner which will produce the most valuable product improves the quality of raw materials available to potential pulp producers.

REFERENCES

1. Duerr, William A., Economic Problems of Forestry in the Appalachian Region, Cambridge, Mass., Harvard University Press, 1949, p. 123.

2. Streyffert, Thorsten, World Timber, Trends and Prospects, Stockholm, Almqvist and Wiksell, 1958.

3. U. S. Department of the Interior, Forest Conservation, Conservation Bulletin 42, Washington, 1960.

4. Dahl, Robert A. and Charles E. Lindblom, Politics, Economics and Welfare, New York, Harper and Row, 1953, p. 40.

5. Dana, Samuel Trask, Forest and Range Policy, Its Development in the U.S., New York, McGraw-Hill, 1956.

6. Marshall, Colin, Sustained Yield Management of the Mangrove Salt Water Swamp Forest of Fiji, Suva, Fiji, Government Press, (195?).

7. Goundrey, G.K., "Forest Management and the Theory of Capital", Canadian Journal of Economics and Political Science, Vol. XXVI, No. 3, August, 1960, pp. 439-451.

8. Loucks, D.P., "The Development of an Optimal Program for Sustained-Yield Management", Journal of Forestry, 62 (7), 1964, (pp. 485-90).

9. Canada, Dominion Bureau of Statistics, Industry Division, Logging, Catalogue No. 25-201 Annual, Ottawa, 1961, Table 3, p. 8.

10. This information was gained in discussions with Mr. Schaltwyk of the Alberta Forest Service.

11. Davis, John, A.L. Best, P.E. Lachance, S.L. Pringle, J.M. Smith, D.A. Wilson, The Forestry Study Group, The Outlook for the Canadian Forest Industries, Royal Commission on Canada's Economic Prospects, W.L. Gordon, Chairman; Hull, March 1957, p. 161.

12. U.S. Department of Agriculture, Forest Service. Timber Trends in the United States, Forest Resource Report No. 17. (Washington: Superintendent of Documents, U.S. Government Printing Office, 1965).

13. U.S. Department of Agriculture, Forest Service, The Demand and Price Situation for Forest Products - 1966. (Washington: Superintendent of Documents, U.S. Government Printing Office, 1967).

14. Nordin, V.J., "Is Forestry Research in Canada Adequate?" Forestry Chronicle, 40 (1), 1964 (pp. 27-32).

15. This information obtained from Mr. D.C. Read of Crown Zellerbach of Canada Ltd.

16. This information from discussions with Mr. Schalkwyk of the Alberta Forest Service.

17. This information from discussion with the Alberta Forest Products Association.

18. Alberta, Department of Lands and Forests, Sixteenth Annual Report, Year ended March 31st, 1965, Queen's Printer, Edmonton, p. 42.

19. This information from the Alberta Forest Products Association.

20. Alberta, Department of Lands and Forests, Seventeenth Annual Report, Queen's Printer, Edmonton, Note to Cutting progress Schedule, p. 45.

CHAPTER V

SUMMARY AND CONCLUSIONS

This study of the pulp and paper industry has laid special emphasis on regional factors influencing the development of the industry. The factors chosen have been those over which the industry has little control and whose nature can be expected to produce regional effects.

A study of markets has its regional impact indirectly through the availability of specific raw materials. In the absence of large local markets, regional opportunities develop only through relative availabilities of raw materials capable of satisfying large external demands economically. The presence of a large external market for white pulp and the availability in Alberta of resources capable of producing premium quality white pulp, points to a possible advantage held by Alberta over other regions.

Costs have direct influence upon the ability of a region to satisfy external demands economically. Here it appears that Alberta suffers a disadvantage which is smaller than might at first be expected. Outward transportation costs are found to be the most important area of disadvantage at present to Alberta producers. Future prospects of lowering these costs appear good, but the possibility of gaining an advantage over other areas for the long run seems slight. However any reduction in these costs reduces the difference in absolute prices of final product and reduces the disadvantage currently effective.

Stumpage costs have received special attention because

they are essentially out of the control of the industry. The operators' bargaining position is weak unless the owner of stumpage becomes desparate to dispose of it due to outside pressure. Otherwise the ability of the owner to exact penalties appears to outweigh the ability of the pulp industry to retaliate. Stumpage prices are especially important where their evaluation is different form region to region. This is the case in Canada where some provinces set dues by regulation while others evaluate in light of the current market price of the final product. The validity of either method is seriously questioned and a discussion of stumpage prices and their theoretical meaning is presented in order to justify this criticism and provide a background for future normative proposals.

In the field of stumpage prices, it may well be that operators may improve their bargaining position as governments become more anxious for the development of the pulp industry in their province. This might be expected to develop in the prairie provinces of Alberta, Saskatchewan and Manitoba. In fact the concessions granted by Saskatchewan for the development of a pulp mill at Prince Albert might be an indication of developing power for industry.

Forest management is important to the attractiveness of an area to the pulp industry because it has a large effect upon the quality of the resource. Thus the pulp industry would probably be more attracted to an area which had available a well managed pulpwood forest rather than to an area offering forest primarily managed for sawlogs. Also the choice between managing

a forest for sawlogs or pulpwood must take into account the particular qualities of the area and its probable eventual utilization.

From a theoretical study such as this it is not possible to arrive at quantitative conclusions about the prospects of a particular area. However some qualitative conclusions can be made.

It would appear that Alberta's only advantage in the pulp and paper industry, springs from the quality of its raw materials. The availability in Alberta of large quantities of lodgepole pine, capable of producing high grade white pulp, and the prospects of expanded utilization of white pulp by paper producers points to an opportunity to produce white pulp in Alberta. However, this opportunity can only be taken advantage of if these raw materials can be obtained economically and if the finished product can be shipped into its market at prices competitive with other producers.

Unfortunately, Alberta's present stumpage pricing system shows prospects of over valuing the stumpage resource, thus delaying or preventing development of the industry in Alberta. Logging costs have prospects for reduction, as do inwards transportation costs, and manufacturing costs are not expected to seriously affect the development of the pulp industry in Alberta. Outwards transportation costs are presently disadvantageous to Alberta producers, but the additional transportation cost over that paid by producers closer to markets is much lower than might be expected. Also prospective reductions in overall transportation costs can be expected to improve the

competitiveness of the price of Alberta pulp.

Current forest management methods enforced in Alberta do not appear to provide the preferred raw material (lodgepole pine) in a form which is optimal for pulp development. Furthermore these regulatory methods do not appear to provide either the province or the producer with the ability to increase the value of the forest and the forest products obtained from it.

In conclusion, it can be stated that Alberta has the resources required to develop a pulp industry in the province. The potential size of the industry is probably quite small due to the strong external competition which exists now and which may be expected to increase in the future. However, this potential cannot be used to its full until the province's resources are managed in such a way as to derive maximum benefit from them, and disposed of according to their economic value. The forest policies adopted by Alberta's government will have an important effect on the development of the pulp industry in Alberta.

BIBLIOGRAPHY

BIBLIOGRAPHY

Books

Alberta, Department of Lands and Forests, Sixteenth Annual Report, Year ended March 31, 1965, Edmonton: 1965, Queen's Printer.

__________, Seventeenth Annual Report, Year ended March 31, 1966, Edmonton: Queen's Printer, 1966.

Canada, Dominion Bureau of Statistics, Industry Division, Logging, Catalogue No. 25-201 Annual, Ottawa:1961.

Canada, Forestry Branch, Canadian Woods, Ottawa: Queen's Printer, 1951.

Canada, Royal Commission on Canada's Economic Prospects, Final Report, November, 1957, Ottawa: Queen's Printer, 1958.

__________, Study by R. D. Howland, Some Regional Aspects of Canada's Economic Development; Queen's Printer, Ottawa, 1957.

Caves, R. E. and Holton, R.H., The Canadian Economy: Prospect and Retrospect, Cambridge, Mass.: Harvard University Press, 1959.

Dahl, R.A. and Lindblom, C.E., Politics, Economics and Welfare, New York; Harper and Row, 1953.

Dana, Samuel T., Forest and Range Policy, Its Development in the U.S., New York: Harper and Row, 1953.

Davis, John, et al., The Outlook for the Canadian Forest Industries, Hull: Royal Commission on Canada's Economic Prospects, 1957.

Duerr, W.A., Economic Problems of Forestry in the Appalachian Region, Cambridge, Mass.: Harvard University Press, 1949.

__________, Forestry Economics, New York: McGraw-Hill, 1960.

Forbes, Reginald D., Forestry Handbook, New York: The Ronald Press, 1961.

Guthrie, John A. and G.R. Armstrong, Western Forest Industry, Baltimore: Johns Hopkins Press for Resources for the Future, 1961.

Howland, R.D., Some Regional Aspects of Canada's Economic Development, Ottawa: Royal Commission on Canada's Economic Prospects, 1957.

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[illegible]

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[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

Books

Landsberg, H.H., L.L. Fischman and Fisher, J.L., Resources in America's Future, Baltimore: Johns Hopkins Press for Resources for the Future, 1963.

Manitoba, Manitoba 1962-1975, Winnipeg: Committee on Manitoba's Economic Future, 1963.

Marshal, Colin, Sustained Yield Management fo the Mangrove Salt Water Swamp Forest of Fiji, Suva, Fiji: Government Press, (195?).

Moore, A. Milton, Forestry Tenures and Taxes in Canada, Tax Paper No. 11, Toronto: Canadian Tax Foundation, 1957.

Newsprint Association of Canada, Newsprint Data, 1965, Montreal, 1965.

Stanford Research Institute, America's Demand for Wood, Stanford: Stanford Research Institute for Weyerhaeuser Timber Company, 1954.

Streyffert, Thorsten, Price Trends in Forest Products and Stumpage, Corvallis: Oregon State University, 1963.

__________, World Timber: Trends, and Prospects, Stockholm: Almqvist and Wiksell, 1958.

United Nations, Food and Agriculture Organization, European Timber Trends and Prospects, New York: United Nations, 1953.

__________, European Timber Trends and Prospects, New York: United Nations, 1964.

__________, Fibreboard and Particle Board, Rome: United Nations, 1958.

__________, Possibilities for the development of the Pulp and Paper Industry in Latin America, New York: United Nations, 1950.

__________, World Pulp and Paper Resources and Prospects, New York: United Nations, 1954.

__________, Yearbook of Forest Products Statistics, Rome: United Nations, 1966.

United States, Department of Agriculture, Forest Service, The Demand and Price Situation for Forest Products--1966, Washington: Superintendent of Documents, U.S. Government Printing Office, 1967.

Books

__________, Timber Resources for America's Future, Forest Resource Report No. 14, Washington: Superintendent of Documents, U.S. Government Printing Office, 1958.

__________, Timber Trends in the United States, Forest Resource Report No. 17, Washington: Superintendent of Documents, U.S. Government Printing Office, 1965.

United States, Department of the Interior, Forest Conservation, Conservation Bulletin 42, Washington: Superintendent of Documents, U.S. Government Printing Office, 1960.

Watkins, M.H. and Forster D.F., Economics: Canada, Toronto: McGraw-Hill, 1963.

Articles

Collinge, H.K., "Reflections on the Forests of Canada in Relation to Northern Development", Unpublished Speech, North West Pulp and Power Ltd., Hinton, Alberta, 1961.

Financial Post, "Pulp mills sprouting too fast?", June 17, 1967.

Goundrey, G.K., "Forest Management and the Theory of Capital", Canadian Journal of Economics and Political Science, XXVI, 3, (1960), pp. 439-451.

Habgood, H.W., "Transportation of Sulphur by Pipeline", Oilweek, October 14, 1963.

Hodgson, G.W. and Jensen, E.J., "Pipelining of Potash- An Examination of the Possibilities", Research Council of Alberta, Edmonton, 1966.

Jensen, E.J. and Ellis, H.S., "Pipelines", Scientific American, January, 1967, pp. 62-72.

Loucks, D.P., "The Development of an Optimal Program for Sustained Yield Management", Journal of Forestry, LXII, 7, (1964), pp. 485-90.

Nordin, V.J., "Is Forestry Research in Canada Adequate?", Forestry Chronicle, XL, 1, (1964), pp. 27-32.

APPENDIX A

TABLE A-1

WORLD SUMMARY OF PRODUCTION OF PULP PRODUCTS BY PRODUCT AND REGION, 1956-1965.

SUMMARY: PRODUCTION

			Wood pulp		Pulp products			
Region	Year	Part-icle Board	Mech-an-ical	Chem-ical[a]	News-Print	Other Paper	Paper board	Fibre board
		(1000 m. t.)						
Europe	1956	372	4990	8669	3426	9719	3957	1291
	1957	480	5131	9201	3521	10381	4344	1407
	1958	576	5122	9113	3523	10743	4448	1479
	1959	836	5468	9833	3814	11624	4642	1549
	1960	1199	6024	11058	4215	13096	5159	1790
	1961	1487	6251	11845	4357	13966	5387	1897
	1962	1833	6266	12080	4319	14371	5638	2040
	1963	2286	6458	13147	4378	15596	6084	2190
	1964	2722	6841	14531	4729	16706	6465	2447
	1965	3332	7188	15345	4967	17711	6680	2534
U.S.S.R.	1956	--	765	1845	360	1634	588	68
	1957	--	808	1967	377	1749	657	93
	1958	22	830	2093	389	1847	720	111
	1959	54	867	2187	401	1926	764	165
	1960	105	931	2282	434	1987	806	214
	1961	174	1028	2415	493	2098	854	279
	1962	223	1121	2595	541	2224	903	314
	1963	278	1150	2758	563	2303	988	349
	1964	385	1150	2757	633	2400	1087	375
	1965	514	--	--	--	--	--	438
North America	1956	137	9195	20620	7317	13312	13885	1715
	1957	227	8983	20252	7409	12672	13680	1629
	1958	300	8699	20271	7037	12737	13791	1705
	1959	368	9361	22532	7507	14117	15060	1966
	1960	339	9578	23786	7886	14364	15314	1813
	1961	406	9502	25134	7958	14682	16045	1871
	1962	517	9865	26462	7955	15332	17065	1974
	1963	632	10117	28525	8047	16005	17852	2159
	1964	806	10767	31105	8707	16895	19184	2252
	1965	1002	10982	32089	8903	17856	20155	2321

[a]Includes semi-chemical wood pulp.

TABLE A-1, SUMMARY: PRODUCTION

Region	Year	Particle Board	Wood pulp: Mechanical	Wood pulp: Chemical[a]	Pulp products: News-Print	Pulp products: Other Paper	Pulp products: Paper board	Pulp products: Fibre board
		(1000 m. t.						)
Central America	1956	--	28	90	--	196	108	10
	1957	--	31	102	--	231	123	12
	1958	--	36	106	6	231	144	14
	1959	1	47	114	18	251	154	18
	1960	1	59	116	22	299	168	22
	1961	--	63	125	22	328	176	20
	1962	6	65	139	17	339	179	37
	1963	12	69	150	22	364	195	30
	1964	16	70	169	16	425	210	34
	1965	17	56	191	23	446	215	32
South America	1956	5	127	96	70	563	247	36
	1957	8	128	117	83	559	233	53
	1958	10	166	127	119	597	292	58
	1959	12	169	164	122	633	314	70
	1960	24	182	238	127	645	312	73
	1961	34	215	350	134	757	384	82
	1962	37	202	364	138	790	419	74
	1963	49	265	448	166	822	406	86
	1964	67	296	552	204	943	447	94
	1965	72	330	572	223	936	457	95
Africa	1956	7	5	57	--	159	77	58
	1957	24	7	73	--	172	73	60
	1958	22	4	86	--	184	81	62
	1959	14	3	84	--	206	86	64
	1960	12	3	107	--	231	88	66
	1961	6	23	130	19	236	92	68
	1962	5	31	154	35	268	108	72
	1963	6	31	296	103	362	129	97
	1964	7	33	317	105	419	131	128
	1965	--	--	--	--	--	--	--
Asia	1956	6	855	1630	712	2239	1045	44
	1957	18	939	1802	800	2644	1289	56
	1958	23	934	1782	890	2933	1405	97
	1959	41	1088	2392	1035	3724	1905	132
	1960	62	1206	3026	1111	4295	2263	208
	1961	84	1271	3670	1205	4849	2745	253
	1962	102	1304	3798	1354	4908	3121	292
	1963	129	1322	4221	1517	5356	3607	332
	1964	165	1375	4632	1687	5750	4242	349
	1965	249	1436	4761	1690	5795	4233	368

[a] Includes semi-chemical wood pulp.

[illegible]

TABLE A-1, SUMMARY: PRODUCTION

Region	Year	Particle Board	Wood pulp: Mechanical	Wood pulp: Chemical[a]	Pulp products: News-Print	Pulp products: Other Paper	Pulp products: Paper board	Pulp products: Fibre board
		(1000 m. t.						)
Pacific Area	1956	--	238	256	134	177	173	116
	1957	--	259	258	148	187	180	119
	1958	5	282	259	160	189	220	126
	1959	5	297	299	165	224	220	137
	1960	6	286	296	181	252	265	144
	1961	9	302	308	182	279	256	145
	1962	14	312	325	207	288	260	134
	1963	24	378	377	262	340	296	146
	1964	42	415	415	281	363	330	169
	1965	65	458	441	294	408	384	196
Total	1956	527	16203	33263	12019	27999	20080	3338
	1957	757	16286	33772	12338	28595	20579	3429
	1958	958	16073	33837	12124	29461	21101	3652
	1959	1331	17300	37605	13062	32705	23145	4101
	1960	1747	18269	40909	13976	35169	24375	4330
	1961	2200	18655	43977	14370	37195	25939	4715
	1962	2737	19166	45917	14566	38520	27693	4937
	1963	3416	19790	49922	15058	41148	29557	5389
	1964	4210	20947	54478	16362	43901	32096	5848
	1965	5258	21633	56473	16838	45971	33342	6112

[a]Includes semi-chemical wood pulp.

Source: Food and Agriculture Organization, United Nations, Yearbook of forest products statistics, Rome: 1966, pp. 2-7.

TABLE A-2

WORLD SUMMARY OF EXPORTS OF PULP PRODUCTS BY PRODUCT AND REGION, 1956 - 1965.

SUMMARY: EXPORTS

Region	Year	Pulp-wood	Wood pulp	Pulp Products: News-print	Pulp Products: Printing and writing paper	Pulp Products: Other paper & paper-board	Pulp Products: Fibre-board
		(1000 m^3)	(1000 m.t.				)
Europe	1956	5198	4948	1304	560	1878	483
	1957	5115	4884	1287	606	2070	543
	1958	4195	4812	1343	568	2032	570
	1959	4680	5320	1361	648	2305	667
	1960	5917	5877	1557	723	2647	752
	1961	7305	5616	1660	865	2821	766
	1962	5563	5842	1673	894	2980	813
	1963	5099	6486	1761	997	3349	881
	1964	5579	7113	1943	1171	3770	936
	1965	5798	7034	2039	1360	3865	891
U.S.S.R.	1956	528	146	61	2	13	--
	1957	591	151	70	--	17	--
	1958	823	219	74	--	20	--
	1959	1181	203	80	--	28	--
	1960	1589	244	94	--	34	--
	1961	2329	266	98	--	47	--
	1962	3259	267	107	--	45	--
	1963	3492	245	105	--	45	--
	1964	4046	264	119	--	56	33
	1965	4184	265	139	--	103	38
North America	1956	4889	2631	5552	102	488	62
	1957	4515	2642	5510	107	575	59
	1958	3292	2480	5271	110	589	42
	1959	2905	2814	5470	122	661	52
	1960	3120	3396	5738	122	765	41
	1961	3174	3671	5838	122	866	41
	1962	3195	3838	5677	127	921	41
	1963	2880	4320	5743	137	1078	54
	1964	3140	4732	6290	177	1393	66
	1965	3440	4815	6599	167	1595	79

TABLE A-2, SUMMARY: EXPORTS

Region	Year	Pulp-wood (1000 M³)	Wood pulp (1000 m.t.)	News-print	Printing and writing paper	Other paper & paper board	Fibre-board
				Pulp Products			
Central America	1956	--	10	--	--	3	--
	1957	50	8	--	--	4	--
	1958	177	4	--	--	--	--
	1959	237	4	--	--	--	--
	1960	184	--	--	--	--	--
	1961	242	--	--	--	1	--
	1962	336	1	--	--	1	1
	1963	242	--	--	--	2	4
	1964	409	--	--	--	1	3
	1965	338	--	--	--	1	3
South America	1956	--	--	--	--	1	--
	1957	--	--	1	--	1	--
	1958	--	--	21	--	1	--
	1959	--	--	35	--	1	--
	1960	--	14	29	--	--	--
	1961	--	37	34	--	--	--
	1962	--	33	25	--	--	--
	1963	--	19	31	--	--	--
	1964	--	26	39	--	--	14
	1965	--	64	62	--	--	14
Africa	1956	--	35	--	1	42	30
	1957	--	50	--	2	41	51
	1958	--	66	--	2	37	40
	1959	--	67	--	2	42	49
	1960	--	88	--	3	44	47
	1961	--	102	--	4	41	44
	1962	--	137	--	4	37	47
	1963	--	244	--	3	37	64
	1964	4	262	1	4	58	53
	1965	--	290	1	3	50	42
Asia	1956	13	--	62	50	53	5
	1957	10	1	30	64	53	4
	1958	20	5	34	53	60	8
	1959	--	5	24	62	73	8
	1960	--	23	41	93	94	2
	1961	5	17	56	128	124	4
	1962	10	7	48	106	117	3
	1963	18	5	44	124	109	3
	1964	21	5	43	114	132	7
	1965	18	26	34	118	159	6

[illegible]

TABLE A-2, SUMMARY: EXPORTS

Region	Year	Pulp-wood (1000 m^3)	Wood pulp (100 m.t.	Pulp Products: News-print	Printing and writing paper	Other paper & paper board	Fibre-board)
Pacific Area	1956	--	48	26	--	4	3
	1957	--	66	37	2	4	2
	1958	--	70	43	2	5	2
	1959	--	79	45	3	6	3
	1960	--	71	50	3	9	6
	1961	--	65	45	6	3	7
	1962	--	71	42	3	4	8
	1963	--	64	108	6	4	19
	1964	--	67	115	10	9	28
	1965	--	55	112	15	4	35
Total	1956	10628	7818	7005	715	2482	583
	1957	10281	7802	6935	781	2765	659
	1958	8507	7656	6786	735	2744	662
	1959	9003	8492	7015	837	3116	779
	1960	10810	9713	7509	944	3593	848
	1961	13055	9774	7731	1125	3903	862
	1962	12363	10197	7572	1134	4105	913
	1963	11731	11383	7792	1267	4624	1025
	1964	13199	12464	8550	1476	5419	1140
	1965	13778	12549	8986	1663	5776	1108

Source: F.A.O., Yearbook of Forest Products Statistics, Rome: 1966, pp. 2-7.

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[illegible]

[illegible]

TABLE A-3

WORLD SUMMARY OF IMPORTS OF PULP PRODUCTS BY PRODUCT AND REGION, 1956 - 1965.

SUMMARY: IMPORTS

Region	Year	Pulpwood (1000 m^3)	Wood pulp (1000 m. t.	Newsprint	Pulp Products: Printing and writing paper	Other paper & paper board	Fibreboard)
Europe	1956	6025	4763	1014	170	1405	345
	1957	5590	4942	1134	203	1648	416
	1958	5100	4851	1175	209	1714	417
	1959	5587	5242	1145	228	1995	481
	1960	7499	6331	1372	319	2435	553
	1961	9614	6240	1478	469	2656	574
	1962	8824	6242	1546	508	2883	628
	1963	8072	7176	1608	594	3276	686
	1964	9998	7809	1749	767	3722	773
	1965	10771	7663	1765	932	4009	734
U.S.S.R.	1956	316	65	14	41	67	--
	1957	363	99	14	--	137	--
	1958	302	86	15	--	119	--
	1959	188	64	15	--	97	--
	1960	150	83	15	--	98	--
	1961	150	107	44	--	136	--
	1962	151	108	56	--	99	--
	1963	--	85	58	--	113	--
	1964	--	123	46	65	61	1
	1965	--	--	56	--	--	1
North America	1956	4424	2175	5053	57	218	106
	1957	4184	1971	4739	41	199	98
	1958	3310	1957	4430	43	221	98
	1959	3054	2266	4774	48	244	148
	1960	3421	2219	4908	48	215	125
	1961	3427	2296	4956	49	238	123
	1962	3394	2642	4969	53	247	154
	1963	3084	2587	4910	61	219	203
	1964	1845	2738	5402	86	218	219
	1965	1833	2915	5736	113	217	242

[illegible]

TABLE A-3, SUMMARY: IMPORTS

Region	Year	Pulp-wood (1000 m^3)	Wood pulp (1000 m. t.	Pulp Products: News-print	Printing and writing paper	Other paper & paper board	Fibre board)
Central America	1956	--	101	133	32	135	1
	1957	--	68	145	34	118	1
	1958	--	69	130	44	123	2
	1959	--	78	138	36	130	2
	1960	--	85	151	26	106	3
	1961	--	121	143	23	94	2
	1962	--	66	166	22	101	2
	1963	--	96	140	19	141	3
	1964	--	112	171	37	216	4
	1965	--	--	172	36	235	5
South America	1956	--	330	345	94	84	12
	1957	--	380	407	106	97	11
	1958	--	332	407	96	99	25
	1959	--	363	383	85	82	15
	1960	--	312	450	88	77	12
	1961	--	365	496	105	88	10
	1962	--	317	414	67	85	11
	1963	--	310	398	48	81	66
	1964	--	357	393	48	116	5
	1965	--	363	375	43	--	5
Africa	1956	--	40	129	61	190	32
	1957	--	46	127	76	221	41
	1958	1	40	135	66	244	31
	1959	1	47	144	77	204	33
	1960	1	58	162	104	252	35
	1961	--	77	158	117	243	26
	1962	--	85	134	91	264	24
	1963	--	92	136	97	270	30
	1964	1	95	160	95	296	34
	1965	--	87	154	132	301	38

TABLE A-3, SUMMARY: IMPORTS

Region	Year	Pulp-wood (1000 m^3)	Wood pulp (1000 m. t.)	News-print	Printing and writing paper	Other paper & paper board	Fibre board
				Pulp Products			
Asia	1956	20	201	255	116	274	62
	1957	65	280	248	138	303	33
	1958	144	158	227	107	293	39
	1959	159	257	268	120	318	32
	1960	213	359	268	144	349	37
	1961	429	470	324	150	378	35
	1962	533	610	269	160	396	34
	1963	525	833	297	172	446	43
	1964	679	874	393	158	556	53
	1965	646	819	343	165	520	55
Pacific Area	1956	--	86	227	75	63	8
	1957	--	108	214	61	50	5
	1958	--	104	312	62	61	3
	1959	--	136	216	57	62	1
	1960	--	172	251	67	78	2
	1961	--	207	301	88	114	2
	1962	--	141	202	67	86	6
	1963	--	224	224	80	89	6
	1964	--	222	262	77	90	4
	1965	--	254	289	76	108	2
Total	1956	10785	7761	7170	646	2436	566
	1957	10202	7894	7028	659	2773	605
	1958	8857	7597	6831	627	2874	615
	1959	8989	8453	7083	651	3132	712
	1960	11284	9619	7577	796	3610	767
	1961	13620	9883	7900	1001	3947	772
	1962	12902	10211	7756	968	4161	859
	1963	11681	11403	7771	1071	4635	977
	1964	12523	12331	8576	1333	5275	1093
	1965	13250	12336	8890	1497	5652	1082

Source: F.A.O., Yearbook of forest products statictics, Rome: 1966, pp. 2-7.

[illegible]

APPENDIX B

TABLE B-1

DERIVED UNIT PRICES, PROPORTION OF QUANTITY OF FOREST PRODUCTS PRODUCED, AND PROPORTION OF VALUE OF ALL FOREST PRODUCTS FOR FOREST PRODUCTION IN 1961, BY SELECTED FOREST PRODUCTS, FOR ALL OF CANADA, EACH PROVINCE, AND THE TERRITORIES.

CANADA 1961

Item	Unit Prices $/cu.ft.	% of Production[2]	% of Value of Production[2]
Logs and bolts	0.23	51.0	47.7
Pulpwood	0.28	39.8	43.6
Fuelwood	0.15	7.2	4.2
Poles and piling	0.69	0.7	2.0
All other products[1]	0.49	1.1	2.2
Weighted average of all	0.25	100.0	100.0

ALBERTA 1961

Item	Unit Prices $/cu.ft.	% of Production[2]	% of Value of Production[2]
Logs and bolts	0.14	61.3	47.9
Pulpwood	0.21	21.5	24.3
Fuelwood	0.11	6.7	4.1
Poles and piling	0.30	0.1	0.1
All other products[1]	0.43	10.2	23.3
Weighted average of all	0.18	100.0	100.0

See end of table for notes.

TABLE B-1 (continued)

NEWFOUNDLAND 1961

Item	Unit Prices $/cu.ft.	% of Production[2]	% of Value of Production[2]
Logs and bolts	0.19	8.6	6.5
Pulpwood	0.31	71.1	83.6
Fuelwood	0.12	19.8	9.3
Poles and piling	0.57	0.07	0.15
All other products[1]	0.35	0.2	0.31
Average unit price in region	0.26	100.0	100.0

PRINCE EDWARD ISLAND 1961

Item	Unit Prices $/cu.ft.	% of Production[2]	% of Value of Production[2]
logs and bolts	0.16	19.4	19.9
Pulpwood	0.20	21.5	26.7
Fuelwood	0.13	57.0	48.6
Poles and piling	--	0	0
All other products[1]	0.37	1.9	4.6
Average unit price in region	0.16	100.0	100.0

See end of table for notes.

TABLE B-1 (continued)

NOVA SCOTIA 1961

Item	Unit Prices $/cu.ft.	% of Production[2]	% of Value of Production[2]
Logs and bolts	0.18	48.9	44.9
Pulpwood	0.20	34.8	35.3
Fuelwood	0.13	14.4	9.7
Poles and piling	0.69	0.07	0.17
All other products[1]	1.23	1.6	9.7
Average unit price in region	0.20	100.0	100.0

NEW BRUNSWICK 1961

Item	Unit Prices $/cu.ft.	% of Production[2]	% of Value of Production[2]
Logs and bolts	0.20	41.4	37.8
Pulpwood	0.25	49.4	54.8
Fuelwood	0.11	7.7	3.8
Poles and piling	0.52	0.41	0.9
All other products[1]	0.65	0.8	2.5
Average unit price in region	0.22	100.0	100.0

See end of table for notes.

TABLE B-1 (continued)

QUEBEC 1961

Item	Unit Price $/cu.ft.	% of Production[2]	% of Value of Production[2]
Logs and bolts	0.22	24.4	21.1
Pulpwood	0.28	62.8	69.0
Fuelwood	0.18	11.3	7.9
Poles and piling	0.57	0.2	0.5
All other products[1]	0.33	0.9	1.2
Average unit price in region	0.26	100.0	100.0

ONTARIO 1961

Item	Unit Price $/cu.ft.	% of Production[2]	% of Value of Production[2]
Logs and bolts	0.26	29.3	25.8
Pulpwood	0.33	61.9	68.5
Fuelwood	0.13	7.6	3.3
Poles and piling	0.55	0.3	0.6
All other products[1]	0.72	0.6	1.5
Average unit price in region	0.30	100.0	100.0

See end of table for notes.

TABLE B-1 (continued)

MANITOBA 1961

Item	Unit Price $/cu.ft.	% of Production[2]	% of Value of Production[2]
Logs and bolts	0.15	22.9	21.3
Pulpwood	0.20	35.4	42.5
Fuelwood	0.11	34.3	24.4
Poles and piling	0.56	1.1	3.9
All other products[1]	0.20	6.1	7.6
Average unit price in region	0.16	100.0	100.0

SASKATCHEWAN 1961

Item	Unit Price $/cu.ft.	% of Production[2]	% of Value of Production[2]
Logs and bolts	0.13	40.2	35.7
Pulpwood	0.17	6.1	6.9
Fuelwood	0.11	43.3	34.4
Poles and piling	0.45	2.6	8.0
All other products[1]	0.29	7.5	14.7
Average unit price in region	0.14	100.0	100.0

See end of table for notes.

TABLE B-1 (continued)

BRITISH COLUMBIA 1961

Item	Unit Prices $/cu.ft.	% of Production[2]	% of Value of Production[2]
Logs and bolts	0.25	83.2	82.4
Pulpwood	0.21	14.7	12.2
Fuelwood	0.18	0.2	0.1
Poles and piling	0.75	1.3	4.0
All other products[1]	0.75	0.3	1.0
Average unit price in region	0.25	100.0	100.0

YUKON AND NORTHWEST TERRITORIES 1961

Item	Unit Prices $/cu.ft.	% of Production[2]	% of Value of Production[2]
Logs and bolts	0.10	63.1	52.2
Pulpwood	--	--	--
Fuelwood	0.12	31.0	31.8
Poles and piling	0.33	5.7	15.9
All other products[1]	--	--	--
Average unit price in region	0.12	100.0	100.0

[1]This classification includes round mining timber, fence posts, hewnties, fence rails, wood for charcoal, miscellaneous roundwood, and other products.

[2]Columns may not add to 100.0 due to rounding by author.

Source: Canada, Dominion Bureau of Statistics, Industry Division, Logging, 1961, Annual, Catalogue No. 25-201, Queen's Printer and Controller of Stationary, Ottawa, 1963, Table 1.

APPENDIX C

This appendix primarily attempts to indicate present levels of stumpage prices in the Canadian provinces of British Columbia, Saskatchewan, Manitoba, Ontario, Quebec and Nova Scotia. Some attention is also given to management methods in force in those provinces and special conditions as they have come to hand. The book Forestry Tenures and Taxes in Canada, by A. Milton Moore contains a thorough explanation of management methods in force for every province of Canada and comments on management methods are largely confined to changes which have occurred since publication of that volume in 1956. The appendix is background material only, although the comparative stumpage prices have a considerable bearing on the subject matter of this thesis especially to relevant sections in Chapter III.

In order that the limitations of the data be made clear it is necessary to present the data with comments on the management methods which give rise to it and thus no summary table has been prepared due to reservations as to the validity of such a table.

British Columbia

Tenure systems and management requirements.

Land is held in two basic ways in British Columbia, as private (Crown granted) land or as Crown land.

Timber is available from Crown lands in a variety of ways not significantly changed.

Licenses remain free of stumpage charges, but renewals are now 50 cents per acre for timber licenses and leases, and 25 cents per acre for pulp licenses. Pulp lease rentals have

not changed. Timber pays statutory royalties as it is cut.

Dominion Timber Berths are unchanged.

Timber Sales. Stumpage is still appraised by imputation of the final 'spread' remaining after costs have been deducted from selling price of either logs or finished lumber. Some part of this spread is made the upset price for the sale. Stumpage rates are now subsequently adjusted by the same appraisal procedure but assuming no change in operating costs and adjustment occurs each time the average market value changes $5.00 from that existing when the existing rates were set. Minimum stumpage has been lowered to 1½ royalty and rental is now 50 cents per acre for all areas east or west of the Cascade mountains. The sliding scale method of adjustment is no longer available optionally unless the license provides specifically for it.

Forest Management Licenses remain unchanged for large holdings of pulp companies.

Public Working Circles are now Public Sustained Yield Units. Established licensees now have more security as they may match the bid of any other bidder when sale is by sealed tender in a fully committed unit. Also other bidders must pay a bidding fee of 5 percent of the tender value.

TABLE C-1

BRITISH COLUMBIA, AVERAGE STUMPAGE RATES INCLUSIVE OF ROYALTY BUT EXCLUSIVE OF RENTS AND TAXES, AVERAGED FOR ALL SPECIES, WEIGHTED BY VOLUME, 1956 - 1966.

Year	Average Stumpage Rate $/hundred cubic feet
1956	$6.87
1957	3.88
1958	2.98
1959	3.88
1960	3.55
1961	2.53
1962	3.01
1963	3.36
1964	4.09
1965	4.20
1966	4.25

Source: Direct communication with British Columbia Forest Service.

TABLE C-2

BRITISH COLUMBIA, AVERAGE STUMPAGE PRICES INCLUSIVE OF ROYALTIES BUT EXCLUSIVE OF RENTS AND TAXES, WEIGHTED BY VOLUME; BY SPECIES, 1966.

Species	Average Stumpage Price $/hundred cubic feet (from Timber Sales)
Douglas Fir	6.70
Cedar	3.18
Spruce	3.47
Hemlock	4.47
Balsam	2.65
White Pine	12.88
Lodgepole Pine	2.77
Larch	6.55
Other Species	3.55
All Species	4.25

Source: British Columbia, Report of the forest Service, 1966, Table 67, p. 98. Department of Lands, Forests, and Water Resources, Victoria, B.C., 1967.

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[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]

[illegible]

Saskatchewan

Regulations made November 9, 1962 and October 14, 1960 do not appear to have changed the situation in Saskatchewan as outlined by Moore

Pulpwood dues are as given in the following table.

TABLE C-3

SASKATCHEWAN. PULPWOOD STUMPAGE DUES EXCLUSIVE OF GROUND RENTALS, WHERE APPLICABLE, AS SET BY REGULATION.

Pulpwood Species	Per Cord (=128 cu.ft.)
Spruce (rough)	$1.40
Spruce (peeled)	1.60
Jack Pine (rough, green)	1.10
Jack Pine (sap-peeled)	1.20
Balsam fir (rough)	1.00
Balsam fir (peeled)	1.10
Poplar (rough)	.75
Poplar (peeled)	.90
Pulpwood from logging tops	.50

Source: Saskatchewan, Regulations under the Forest Act, 1959, by Order in Council 1774/60. The Saskatchewan Gazette, Friday, October 14, 1960; Vol. 56, No. 41, pp. 923-938.

The majority of Saskatchewan's forest resources are reserved for exploitation by a Crown corporation -- Saskatchewan Forest Products. Hence stumpage rates are unrealistic since the Crown meets its requirements by claiming profits of the corporation. Some timber is released by licenses or special

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[illegible]

[illegible]

[illegible]

[illegible]	[illegible]

[illegible]

[illegible]

leases to pulp mills but no lease is to hand. The above stumpage rates are therefore not valid for purposes of comparison with other provinces.

Manitoba

Significant changes have occurred in tenure arrangements available in Manitoba. Timber is now made available through timber sales as a percentage of the allowable cut from an area. A quota system is in operation under which an established operator's quota is that percentage of the allowable cut which would make available his average cut over the previous three years. Quotas are transferable and reductions in the total allowable cut is reflected by an equivalent percentage reduction in each quota in that forest.

Timber sales are made available at public auction but new timber sales and permits contain a clause guaranteeing the operator his quota for fifteen years. Timber sales are made out of Forest Management Units.

Forest Management Licenses are available to large timber users such as pulp mills and timber dues on these are set by negotiation.

Only timber dues as set by regulation are available at present and these are not meaningful for comparison as the Timber Sales are open to competitive bidding and therefore may exceed the basic rates. Also timber dues may vary to conform to the appraised rate or bid.

TABLE C-4

MANITOBA, PULPWOOD STUMPAGE DUES AS SET BY REGULATION, BY REGION AND SPECIES ($/CORD).

Species	REGION		
	East of Red River & south of Pulpwood Berth No. 1, Block 1.	South of Township 47 except (1)	North of Township 47
Spruce & Balsam	2.50	1.75	1.50
Jack Pine	2.00	1.50	1.25
Poplar	1.00	1.00	1.00

Source: Manitoba, The Forest Regulations, Order in Council 865/65 Manitoba Regulation 52/65 pursuant to The Forest Act, Ch. 19, Statutes of Manitoba, 1964 (1st Session).

Ontario

Although some modifications have been made in management requirements in Ontario, no significant changes in modes of tenure have occurred since 1956. What changes have occurred pertain to the reforestation program which is progressing in the Province.

The following table provides derived unit stumpage dues from value and quantity data supplied by the Timber Branch of Ontario.

TABLE C-5

DERIVED AVERAGE UNIT STUMPAGE DUES CHARGED PER 100 CUBIC FEET OF PULPWOOD CUT IN ONTARIO, BY SPECIES AND YEAR. ($/cu.ft.) FOR PERIOD APRIL 1 TO MARCH 31, 1959 - 1965

Species	1959	1960	1961	1962	1963	1964	1965
Ash	1.07	0.90	0.92	0.90	1.41	1.06	0.94
Balsam							
local	2.12	2.04	2.09	2.10	2.07	2.09	2.06
export levy	+1.17	+1.17	+1.17	+1.17	+1.17	+1.17	+1.17
Basswood	2.00	1.17	7.64	0.87	1.10	0.87	0.82
Beech	1.02	0.85	1.80	0.90	0.88	0.87	0.89
Birch, white	0.97	1.21	1.50	1.00	1.13	1.04	1.09
Birch, yellow	1.97	0.88	0.92	n.a.	1.12	1.04	1.01
Cedar	2.49	1.78	2.42	1.95	n.a.	n.a.	2.11
Elm	0.88	0.88	0.93	0.84	0.97	0.88	0.91
Hemlock	1.66	n.a.	1.83	1.64	2.61	1.80	1.77
Maple	1.04	1.03	2.23	0.84	1.15	0.82	0.96
Oak	0.99	0.88	0.88	0.85	0.88	0.80	0.96
Pine, jack							
local	2.48	2.48	2.49	2.50	2.52	2.53	2.58
export levy	+0.58	+0.58	+0.58	+0.58	+0.58	+0.58	+0.58
Pine, red	1.74	1.78	2.40	4.32	3.95	7.28	4.27
Pine, white	1.72	2.22	2.34	2.82	2.74	2.43	2.49
Poplar							
local	0.84	0.88	0.90	0.87	0.81	0.85	0.82
export levy	+0.11	+0.11	+0.11	+0.11	+0.11	+0.11	+0.11
Spruce							
local	3.66	3.68	3.72	3.68	3.71	3.70	3.72
export levy	+1.17	+1.17	+1.17	+1.17	+1.17	+1.17	+1.17
Tamarack							
local	3.20	2.15	2.64	2.16	1.81	1.87	1.81
export levy	n.a.	+0.96	+0.12	+1.16	n.a.	n.a.	+0.11

Source: Tables giving summary of volume and value of timber cut during period April 1 to March 31 for the end years 1959 to 1965. Contained in the Ont. Annual Report of the Minister of Lands and Forests of the Province of Ontario 1960-1966.

Quebec

No information has been obtained on changes effective in Quebec forest tenures since 1956. However the following up-to-date tabulation of stumpage dues has been made available and reveals by its date that no changes have been made. Other charges such as rents, fire protection tariffs, etc. are not included. At the time Moore's book was published there was neither Crown evaluation nor bid bonus in effect.

TABLE C-6

QUEBEC, CROWN STUMPAGE DUES FOR WOOD CUT ON LICENSED LANDS FOR PRODUCTION OF PULP AND PAPER, BY SPECIES.

Species	Stumpage dues $ per cord	Stumpage dues $ per 100 cu.ft.
Spruce, Balsam	2.50	2.94
Jack Pine	2.00	2.35
Poplar, Aspen	1.00	1.19
Other species	2.00	2.32

For sap-peeled wood, add 12 percent of the above mentioned tariff.

For woods peeled by knife or plane, add 20 percent.

Note: includes all stumpage dues and permits.

Source: Quebec, Order in Council, Executive Council Chamber, No. 433, Quebec, 21st April 1955.

Nova Scotia

Most of Nova Scotia's forests remain in the hands of private owners. Approximately 55 percent of the forest land is owned by small private woodlot owners (those owning less than 1,000 acres), approximately 20 percent is owned by large freehold owners (those owning over 1,000 acres), and approximately 25 percent is owned by the provincial Crown. Crown lands still show a low yield per acre at between 2 and 4 cubic feet, indicative that the provincial Department of Lands and Forests is continuing its policy of upgrading denuded lands.

Prices supplied as giving a general idea of current stumpage rates are as follows:

Pulpwood Softwood - Average $3.00/cord
Range $1.00 to $4.00/cord

Pulpwood Hardwood - Average $0.50/cord

APPENDIX D

TABLE D-1

PULPWOOD PRICES IN THE UNITED STATES, BY SELECTED SPECIES, 1940-1966 (DOLLARS PER STANDARD CORD, INCLUDING BARK)

WISCONSIN

Year	Spruce		Aspen	
	Current dollars	1957-59 dollars	Current dollars	1957-59 dollars
1940	9.00	20.95	4.25	9.90
1941	10.50	21.95	4.75	9.95
1942	12.25	22.70	6.90	12.80
1943	14.75	26.10	8.75	15.50
1944	15.00	26.35	9.00	15.80
1945	15.00	25.90	9.60	16.60
1946	16.50	24.95	10.00	15.15
1947	23.75	29.25	11.50	14.15
1948	22.25	25.30	12.00	13.65
1949	18.50	22.15	9.25	11.10
1950	19.50	22.45	9.50	10.95
1951	22.50	23.25	10.50	10.85
1952	25.00	26.60	12.25	13.05
1953	23.25	25.10	12.00	12.95
1954	24.25	26.10	12.50	13.45
1955	24.75	26.55	11.50	12.35
1956	26.00	27.05	12.25	12.75
1957	26.00	26.25	11.75	11.85
1958	26.25	26.15	12.00	11.95
1959	26.25	26.10	11.50	11.45
1960	26.75	26.55	12.00	11.90
1961	27.25	27.15	13.00	12.95
1962	27.25	27.10	12.75	12.65
1963	25.75	25.65	13.75	13.70
1964	--	--	--	--
1965	--	--	--	--
1966[1]	--	--	--	--

[1]Preliminary

TABLE D-1

PULPWOOD PRICES IN THE UNITED STATES, BY SELECTED SPECIES, 1940-1966 (DOLLARS PER STANDARD CORD, INCLUDING BARK)

SOUTHEAST

	ROUNDWOOD			
	Southern pine		Hardwoods	
Year	Current dollars	1957-59 dollars	Current dollars	1957-59 dollars
1940	4.20	9.75	--	--
1941	4.60	9.60	--	--
1942	6.00	11.10	--	--
1943	7.20	12.75	--	--
1944	8.20	14.40	--	--
1945	8.40	14.50	--	--
1946	10.10	15.30	--	--
1947	11.00	13.55	--	--
1948	11.70	13.30	--	--
1949	11.00	13.15	--	--
1950	11.90	13.70	--	--
1951	13.80	14.25	--	--
1952	13.90	14.80	--	--
1953	13.90	15.00	--	--
1954	14.00	15.05	--	--
1955	14.40	15.45	--	--
1956	15.40	16.00	--	--
1957	15.50	15.65	13.35	13.50
1958	15.50	15.45	13.45	13.40
1959	16.00	15.90	13.70	13.60
1960	16.45	16.35	13.60	13.50
1961	16.55	16.50	13.50	13.45
1962	16.55	16.45	13.40	13.30
1963	16.55	16.50	13.45	13.40
1964	17.00	16.90	13.60	13.55
1965	17.65	17.20	14.35	14.00
1966[1]	17.75	16.75	14.50	13.70

[1]Preliminary

TABLE D-1

PULPWOOD PRICES IN THE UNITED STATES, BY SELECTED SPECIES, 1940, 1966 (DOLLARS PER STANDARD CORD, INCLUDING BARK)

MIDSOUTH

	Southern pine		Hardwoods		Plant byproducts Southern pine	
Year	Current dollars	1957-59 dollars	Current dollars	1957-59 dollars	Current dollars	1957-59 dollars
1940	4.00	9.30	--	--	--	--
1941	4.90	10.25	--	--	--	--
1942	6.10	11.30	--	--	--	--
1943	7.40	13.10	--	--	--	--
1944	8.55	15.05	--	--	--	--
1945	9.00	15.55	--	--	--	--
1946	10.05	15.20	--	--	--	--
1947	11.20	13.80	10.15	12.50	--	--
1948	11.90	13.55	10.05	11.45	--	--
1949	11.55	13.85	9.35	11.20	--	--
1950	12.15	14.00	10.65	12.25	--	--
1951	14.25	14.75	13.00	13.45	--	--
1952	14.30	15.20	12.90	13.70	--	--
1953	14.25	15.35	12.80	13.80	--	--
1954	14.30	15.40	12.85	13.85	--	--
1955	14.60	15.65	12.90	13.85	--	--
1956	15.65	16.25	13.50	14.05	--	--
1957	15.30	15.45	13.35	13.50	14.25	14.40
1958	15.30	15.25	13.10	13.05	14.30	14.25
1959	15.70	15.60	13.10	13.00	14.30	14.20
1960	16.05	15.95	13.10	13.00	14.40	14.30
1961	15.85	15.80	13.05	13.00	14.50	14.45
1962	15.80	15.70	13.20	13.10	14.60	14.50
1963	15.75	15.70	13.10	13.05	14.40	14.35
1964	15.90	15.80	13.15	13.10	14.30	14.25
1965	16.30	15.90	13.80	13.45	14.40	14.05
1966[1]	17.00	16.05	14.50	13.70	15.00	14.15

[1]Preliminary

Sources: Current dollars, University of Wisconsin, Extension Service College of Agricultire, Wisconsin Forest Products Price Review, U.S. Dept. of Agriculture, U.S. Forest Service Research Note: Pulpwood Price Trends in the Midsouth (Annual) & U.S. Forest Service Research Note: Pulpwood Prices in the Southeast (Annual). 1957-59 dollars derived by dividing the price in current dollars by the Wholesale Price & Price Indexes, (Monthly) of all commodities published by the U.S. Dept. of Labor, Bureau of Labor Statistics.

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